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## PROPOSED CHANGE IN ST. CLAIR CANAL PROJECT.

The river and harbor bill as it passed the house contains an appropriation of something like \$330,000 for the construction of an additional ship canal in Lake St. Clair paralleling the present one, through which all the stupendous commerce of the lakes has to come. It appears, however, from a conference held in Cleveland on Wednesday of this week that Mr. Don M. Dickinson, who is in Washington, has secured a stay of proceedings, as far as this appropriation is concerned, until the question of diverting the route of the proposed additional ship-canal can be considered. Mr. Dickinson advocates, not a parallel ship-canal, but an extension of the old middle channel through Lake St. Clair to connect with the regular channel about a mile below the present ship-canal. The old middle channel runs to the westward of Herson's island and joins the St. Clair river at Algonac. It has not been in use for several years. The present channel is eastward of Herson's island. Mr. Dickinson bases his argument for the resurrection of the middle channel upon the fact that it will obviate the danger of collisions in that narrow and tortuous portion of St. Clair river, which is really the one big argument in its favor. His idea is that down-bound vessels can utilize the present channel and upbound vessels the old middle channel. Mr. Dickinson was represented at the conference in Cleveland by Capt. McQueen of Algonac. There were present Capt. Geo. P. McKay, Capt. J. C. Gilchrist, Capt. John Mitchell, Mr. James Corrigan, Mr. W. W. Smith and Mr. Harvey D. Goulder. The proposition was entirely new to the vessel men, who had heard nothing of the influences at work to divert the proposed additional ship-canal. Mr. Goulder said that it had taken ten years of pleading to get the present appropriation in the river and harbor bill and he thought it manifestly unfair to jeopardize its passage by advancing a new plan at the eleventh hour. He added that if the present plans are unaltered an additional ship-canal, so badly needed, will be secured within the immediate future; if altered, what with additional legislation for new surveys, it may take years to realize. The vessel men were, therefore, unalterably opposed to the new plan of dredging through Lake St. Clair from the old middle channel to connect with the present route of navigation. They promised, however, as soon as the additional ship-canal upon the present route is secured, to advocate its extension through Muscamoot bay to connect with the old middle channel. This may be done without entailing by any means as much work as would have to be done under Mr. Dickinson's plan. Capt. McQueen saw the force of the argument and indorsed it. He promised also to endeavor to secure its indorsement by Mr. Dickinson and added that he had no doubt that he could. It is quite evident that any attempt to alter present plans is to say the least risky business. The commerce of the lakes is growing so fast that there should be no delay in furnishing relief at the St. Clair ship-canal.

## ENLARGEMENT OF THE ERIE CANAL.

The Canal Association of Greater New York is evidently not discouraged on account of the latest failure in the matter of canal legislation. It is announced that the association is to undertake even a more active campaign than has ever before been made for Erie canal improvement. A largely-attended meeting of the association was held this week, at which it was decided to fight for the passage of a bill at the next meeting of the legislature providing for a 12-ft. canal—a canal of the 1,000-ton barge kind. H. B. Hebert, president of the association, said:

"I do not see why the newspapers of New York do not all of them have big articles on this canal matter every day. It is by far the most important question the people of New York have to consider. We have the finest port in the world here, and the tallest buildings, and the greatest city, but what avail will the splendid harbor or the tall buildings be or how are we to hold our greatness if the commerce of the country is to be diverted to other places? This is exactly what is being done. It has been going on since 1882. The railroads are acting together and acting against New York. The two last reports of the interstate commerce commission state that there is a combination of the railroads. In a recent speech Senator Depew boasted that there never had been as close community of interest and as perfect an understanding between the railroads as there is today. All elements of competition have been eliminated from the transportation business. The New York roads do not seek to protect New York. They would just as soon that the traffic would go some other way, and the traffic that should come here is being turned away, so that New York is rapidly losing its commercial prestige. The only solution of the matter—the only way to save the city's commercial greatness—is to build a canal on which 1,000-ton barges can be hauled, and in this way bring a competition that will put an end to the unjust discrimination from which New York is now suffering so much."

"It seems a shame," Mr. Hebert continued, "that the great matter should be held back by that portion of the state outside of New York and Buffalo. The last census shows that in ten years New York city gained almost 1,000,000 people and Buffalo almost 100,000, while the rest of the state gained less than 250,000. The great commercial and industrial wealth of the state is in these two cities, and the rest of the state should not hold them back. We will try to interest the people of the whole state in this matter, and expect to win at the next session of the legislature."

At the meeting Mr. Gustav Schwab spoke of the matter from the position of the steamship men. He called attention to the fact that it is no longer possible for ships to load with certain classes of cargoes in New York as they formerly did. He pointed out how other ports were constantly increasing their business at the expense of New York, and said that if certain lines of business were not to be lost altogether the canal improvements must be made. A number of others present spoke along the same lines and resolutions were unanimously adopted for the enlargement of a waterway system connecting New York and the lakes.

## SHIP BUILDING AT NEWPORT NEWS.

Newport News, Va., April 16.—The Newport News Ship Building & Dry Dock Co. has just received from the Saginaw Steel Steamship Co., of New York, a contract to build an oil tank steamship of 10,500 tons displacement, with the following dimensions: Length, 400 ft.; beam, 50 ft.; draught, 25 ft. Work will begin on this ship at once and will be hurried to completion. This is the third important contract received by the ship yard in the past two months, the other two being for the palatial Old Dominion steamship Monroe and the lumber steamer which will ply in the redwood trade on the Pacific coast. The prediction is made that the next year will be the busiest in the history of the ship yard. In addition to the three new contracts just received, it is stated semi-officially that the company hopes to secure other large vessels to build in the very near future. The largest number of vessels under construction at one time here has been thirteen. Eleven ships are now under contract and it is believed that a sufficient number of additional contracts will be secured to make the construction in hand eclipse all previous records. In addition to several large ships, on which bids have been submitted and which the company expects to secure, it is stated authoritatively that the syndicate for which the lumber steamer is building will have two duplicates constructed, and in all probability these contracts will come to the Newport News yard.

The ship yard now has orders in hand amounting in value to more than \$20,000,000. The eleven ships represented in this amount are the first-class battleships Virginia and Missouri, the armored cruisers Maryland and West Virginia, the protected cruiser Charleston and the monitor Arkansas, for the United States government; the steamships Korea and Siberia, for the Pacific Mail Steamship Co.; the Old Dominion liner, the oil ship, and the lumber ship above referred to.

The keel for the Old Dominion steamship Monroe has been laid. The oil steamer and lumber steamer will be built on one set of ways in tandem fashion. The monitor Arkansas was given a successful dock trial this week. Ground was broken this week for the addition to be made to the machine shops. This addition will enlarge the shops by an extension of 60 ft. and will give more room for the installation of new machinery. The large extension to the general office building is going up rapidly. Other buildings in the yard will be enlarged at once, these extensions being made necessary by the increased amount of construction in hand and in sight.

The training ship Essex, one of the last of the ships of the old civil war navy, was docked at the navy yard last week for the purpose of determining her condition. Her propeller was removed. It is the general opinion among naval men that she will be consigned to "rotten row." The hull was found to be in bad condition. The examination and survey resulted in the condemnation of almost a third of her timbers. The navy department will notify the commandant at the yard in a few days whether or not the ship will be repaired.

## NAMES OF NEW LAKE STEAMERS.

Now that the large fleet of new vessels ordered from the American Ship Building Co. within the past eight or ten months are coming into commission it is probably in order to give their names.

Four steamers for Messrs. Hawgood of Cleveland are named Etruria, Bransford, J. M. Jenks and Harold B. Nye. The two latter, building at Lorain, will not be out for some time to come.

Mr. Edward Carter's two steamers, building at Chicago, are named Luzon and Panay.

All five of the steamers built for J. C. Gilchrist at Lorain are practically in commission. The names are F. M. Osborne, Frank W. Hart, E. N. Saunders, C. W. Watson and Steel King.

Capt. W. W. Brown of Cleveland has three of his six new steel steamers in commission. Names of the six are Wm. Nottingham, L. C. Smith, Horace F. Wilkinson, A. G. Brower, W. W. Brown and John B. Cowle. The last named steamer, building at the works of the Jenks company, Port Huron, will be quite late in coming out.

Sultana and Sonora are the names selected for two steel steamers building at the West Superior works for G. A. Tomlinson of Duluth. Another steamer building at these works will be named Jas. H. Hoyt and a fourth will be named Geo. G. Grammer. The Hoyt is for the Provident Steamship Co., of which A. B. Wolvin is manager, and the Grammer is for Frank Seither and others of Cleveland.

W. H. Gratwick and James Gayley are the names given to the two new Mitchell steamers that are completed. Two other Mitchell boats, to be built at Lorain, and which will not be completed until late in the season, have not been named as yet.

A steamer to be launched shortly at the Globe yard, Cleveland, probably on Saturday, the 26th inst., will be named W. C. Richardson. She is to be owned by W. C. Richardson and others of Cleveland. The steamer building at Bay City for A. E. Stewart and others of Detroit will also be named for her managing owner.

A steamer and barge building at Detroit and Buffalo, respectively, for the Franklin Transportation Co., of which D. R. Hanna of Cleveland is manager, will be named, respectively, Wm. F. Fitch and Alexander Maitland.

No name has as yet been selected for the large steamer building at the Craig works, Toledo, for Thomas Adams and others of Detroit. It was said some time ago that this steamer would be named Wm. McKinley. The lumber steamer building at the Craig works for Cleveland and Buffalo parties, and which was launched Wednesday, is named Chas. Beatty.

It is well known, of course, that the two large side-wheelers, building at Detroit for Detroit-Buffalo service, are to bear the names Eastern States and Western States, and that Greyhound will be the name of the White Star line excursion steamer, also building at Detroit.

## RIVER AND HARBOR BILL AMENDMENTS.

The senate committee on commerce has completed the river and harbor bill, numerous amendments being added. The increase of appropriations amounts to \$9,609,172. Of this increase \$4,691,835 is in the way of direct appropriation and the remainder for contracts authorized. The total appropriations, direct and indirect, carried by the house bill was \$60,688,267. The senate increase as recommended by the committee brings the grand total up to \$70,297,439. The house bill contains a provision to extend the Cleveland breakwater to Gordon park; the senate bill strikes this provision out and inserts one to extend the breakwater to Case avenue. Substantially no decreases were made in the items of the bill as they came from the house. The following are given as the principal items of increase: Removal of Henderson's point, Portsmouth harbor, N. H., \$200,000; contract authorized, \$400,000; harbor of refuge, Point Judith, R. I., \$100,000; dam at Natrona, Allegheny river, Pa., \$50,000, and contract, \$239,622; Buttermilk channel, N. Y., \$200,000; Curtis bay, Baltimore harbor, \$50,000; contract, \$150,000; Biscayne bay, Fla., \$150,000; contract, \$466,667; Brazos channel, Texas, \$400,000; Galveston inner harbor, Texas, \$200,000; contract, \$400,000; Saugatuck harbor, Mich., contract, \$135,000; Oakland harbor, Cal., contract, \$868,203; Tacoma harbor, Wash., contract, \$225,000; Guam harbor, \$150,000; Anacostia river, D. C., \$150,000; Appomattox river, Va., \$25,000; contract, \$175,000; Cape Fear river, N. C., \$150,000; Coosa river, Ga. and Ala., \$475,000; contract, \$199,845; Paschaloula river, Miss., \$50,000; contract, \$250,000; Trinity river, Texas, \$25,000; contract, \$150,000; Upper White river, Ark., \$200,000; Big Sandy river, W. Va. and Ky., \$250,000; contract, \$250,000; Mississippi river, mouth of the Ohio to the mouth of the Missouri, \$50,000; contract, \$150,000; Mississippi river harbors, \$620,000; Missouri river, \$320,000; Stockton and Mormon channels, Cal., \$50,000; contract, \$275,000; Columbia river, canal at the Dalles, Ore., and Wash., \$400,000.

## HAVANA THE BEST NAVAL BASE.

A dispatch from Washington says that the superiority of the harbor of Havana over all other in the West Indies for an American naval base commanding the gulf of Mexico and the isthmian canal, is the most notable conclusion of Admiral Bradford's tour of observation along the coasts of Cuba and Porto Rico upon which he was sent by the general naval board last month. His investigations further demonstrated the comparative unimportance of San Juan, Porto Rico, for naval purposes. He further learned from the reports of the naval officers that are making hydrographic surveys in Cuban waters that the isle of Pines is unapproachable to vessels of more than 14 ft. draught and is therefore valueless to the United States for naval purposes. Similarly the latest surveys of the harbor of San Juan show that it can never accommodate heavy battleships, the entrance channel being shallow with a hard coral bottom which cannot be deepened. It is, besides, difficult of entrance and exposed to attack from a distance. The admiral also visited Nipe and Guantanamo where he found the harbors easily accessible to the largest warships and affording security for coaling and repairs, but at neither harbor would labor be available in time of peace, and for many years they will be useful to the United States only for coaling stations. A naval station at Havana is, therefore, regarded as a necessity by Admiral Bradford and other naval officials. It would afford the only refuge and base of operations for United States battleships and first-class armored vessels within a radius of 1,000 miles, to secure this country's own defence, provide for the protection of Cuba and police the approaches to the isthmian canal. Whatever antagonism had developed in the last few months to a United States navy yard at Havana appears to have been recently aroused through obscure influences to secure to the new Cuban government possession of all the public lands which had been held by Spain and is not to be taken seriously.

## PAY UNDER THE PERSONNEL ACT.

The Supreme court of the United States has rendered an important decision in a case involving the pay provisions of the navy personnel act. On March 3, 1899, Rear-Admiral Frederick Rodgers was commissioned a rear-admiral, and from that time until March 2, 1901, he was one of the rear admirals embraced in the nine lower numbers of the grade. He served at sea save from March 3, 1899, to Feb. 3, 1901, and while at sea received the same pay as was allowed to a brigadier general; on shore duty his pay was at the same rate less 15 per cent., with commutation in place of quarters allowance. In the court of claims, Rear-Admiral Rodgers brought suit for \$3,358.13, claiming it as balance due on account of pay and allowances from March 3, 1899, to March, 2, 1901. He contended that the purpose of the navy personnel act was not to limit or qualify the right of the nine junior rear admirals to the full pay given by law to a brigadier general. It was his contention also that after June 30, 1899, all rear admirals became entitled to the pay and allowances of a major general. The court of claims decided in favor of the government, and Rear-Admiral Rodgers appealed, the supreme court affirming the finding of the lower court.

## DOMINION COAL CO. ABSORBED.

A dispatch from Montreal outlines the absorption of the Dominion Coal Co. by the Dominion Iron & Steel Co. of Sydney, N. S. This has been foreshadowed by activity in the stock of the coal company for some time past. The steel company takes over all the properties and assets of the coal company, guaranteeing the shareholders 8 per cent. upon a capitalization of \$20,000,000. The common stock of the coal company now stands at \$15,000,000, but it has some bonds and preferred stock outstanding and the terms of the lease provide that these bonds and stock shall be retired by the issue to the holders thereof of \$5,000,000 of the common stock of the company at 120, making the total capital stock issue of the coal company upon which the steel company is to pay 8 per cent., \$20,000,000. The directors of the steel company also decided to issue \$5,000,000 of new stock and to offer it at 60 cents on the dollar pro rata to the present holders of the company's common stock. This issue has already been underwritten by a syndicate of Canadian and American capitalists.

Bertelsen & Petersen, East Boston, Mass., are making extensive repairs to the lighthouse tender *Lilac*.

## MARCONI'S LATEST FEAT.

Marconi's latest feat, the printing by a receiver on board the Philadelphia of messages from Cornwall, 1,551 miles away, and receiving of signals up to 2,099 miles, is recorded in the April McClure's. Fully two miles of tape were covered with messages and signals, signed and certified to by the steamer's officers. The same installation was used as on all steamers, except that this one was fitted with special coherer attachments attuning it to the Poldhu station. In place of one aerial wire, four were used in parallel, the end 150 ft. above water, against 400 ft. at St. John's. At Poldhu, by voltage of 250,000, when the operator pressed the telegraph key, a spark a foot long and as thick as a man's wrist, the most powerful yet devised, sprang across the gap; the very ground quivered with the energy. No human being could stand near. Three thousand miles away a few slender wires picked up an infinitesimally small part of the energy radiated. With every tick of the inker on the tape there are hundreds of thousands of waves in the ether to produce it.

The supreme test came when the ship was 1,551.5 miles from Poldhu. Marconi and the captain held their watches. Ten seconds before the expected working period a snap of the brake set the coil in motion. The two waited with breathless expectancy. The captain had been one of the sceptics at the start. Now he was all confidence and enthusiasm. Almost exactly on the second there was a slight buzz near the coherer. Marconi lifted his hand. "Tap, tap, tap," sounded the inker. The young man smiled. "Is that proof enough, captain?" For exactly ten minutes the signals continued in unbroken order.

"Now," said Marconi, "let us see whether these instruments will get anything during the five minutes' rest period. You know some of the scientists say my receivers may be affected by atmospheric electricity. It is possible, too, that some of the other ocean liners may be operating within range. If they are we shall not know it, for these instruments are tuned to receive messages from the Cornwall station only. But some people say I cannot tune my messages." Again the two waited. Nothing appeared on the tape, although it was allowed to unroll. Then, again, as suddenly and as strangely as before, began the "tap, tap, tap," of the inker. The Poldhu operators had returned to their labors. The signals continued to come during the working periods of the next day. Shortly before the end of the appointed hour in the evening the last set of signals arrived. The ship was 2,099 miles from Poldhu. The record established at Newfoundland had been broken. The fact that the *Umbria*, equipped with a Marconi installation and only a few hours behind the *Philadelphia*, did not receive a single signal from Poldhu proves conclusively Marconi's assertion that he can so regulate his instruments that only the proper stations shall receive certain messages.

"I knew that the signals would come up to 2,100 miles, because I had fitted the instruments to work to that distance," he replied to a question. "If they had not come I should have known that my operators at Poldhu were not doing their duty. Why, I can sit down now and figure out just how much power and what equipment would be required to send messages from Cornwall to the Cape of Good Hope or to Australia. I cannot understand why the scientists do not see this thing as I do. It is perfectly simple, and depends merely on the height of wire used and the amount of power at the transmitting ends. We found several years ago that, if we doubled the height of our aerial wire, we quadrupled the effect. We used one-fortieth of a horse power then. Now I use several horse power, and, by producing a powerful voltage, I naturally get an effect in proportion to that power. It is not possible to keep on extending the height of our aerial conductors, so we simply use more power when we wish to do long distance work. Give me a week at Nantucket and I will guarantee to receive signals from England. As soon as we can get up stations in this country similar to our station at Poldhu we shall be able to transmit and receive any and all kinds of messages across the Atlantic."

## STEAMER SERVICE IN CENTRAL AFRICA.

The Scientific American says that the British government has just completed the survey of the English section of the Victoria Nyanza, in Central Africa, for the establishment of a steamer service on the lake in connection with the Uganda railway which has recently been completed. The surveying has occupied thirteen months and was carried out by two surveyors in two small steel boats. Every part of the British shore of the Nyanza was explored, aggregating over 2,200 miles of coast line, mainland, and islands. The latter have been accurately charted for the first time, and in parts the maps of the lake shore have been altered from their existent physical condition. The lake is studded with a very large number of islands of varying sizes, many of them densely populated. The British portion of the lake is about 135 miles from east to west, and about ninety from the north to the Anglo-German boundary, excluding the eastern gulf forty miles long, which has now been properly mapped. The lake is constantly subject to storms, which render it dangerous to navigation. Owing to this fact, and the smallness of the boats, it was not thought advisable to visit three small islands which were visible far out in the lake, but with these exceptions every island has been visited and mapped by the expedition. During the journey the surveyors discovered several islands inhabited by savages. Even some of the tiniest rocky islets were found to be tenanted by fishermen. Preparations are being made for the development of the lake traffic with the opening of the railway, and passengers leaving the train at Port Florence, on the lake shore terminus of the railroad, will step on board twin-screw steamers alongside the jetty, which will convey them to the different stations. One of the steamers for this service has already left England, and should be on the lake by June. Another steamer will follow. These vessels are each 175 ft. in length and draw 6 ft. of water.

The North German Lloyd steamer *Brandenburg* arrived at New York on April 4 from Bremen on her maiden trip. She is 450 ft. long, 54 ft. wide and 42 ft. deep, and was launched at Vegesack, Germany, on Dec. 22. She has a carrying capacity of 12,000 tons and has accommodations for fifty cabin and 1,656 steerage passengers. She is low-powered and is designed for 13 knots speed.

The house naval committee has adopted a provision for the naval appropriation bill to give the commander of the marine corps the rank of major general.

## MONTREAL, OTTAWA AND GEORGIAN BAY CANAL.

A BILL AUTHORIZING CONSTRUCTION OF THE CANAL HAS BEEN REPORTED FAVORABLY TO THE CANADIAN PARLIAMENT—PHYSICAL FEATURES OF THE ROUTE—ARGUMENT IN FAVOR OF ITS CONSTRUCTION.

It was noted in the last issue of the Review that the Montreal, Ottawa & Georgian Bay Canal Co.'s bill had been reported favorably by the senate railway committee at Ottawa. The time for the completion of the canal is extended to 1910. The cost is estimated at \$80,000,000. The committee submits the following description of route:

"The water surface of Georgian bay at ordinary stage is about 564 ft. above that of the St. Lawrence river at Montreal harbor. It is proposed to raise and maintain the level of Lake Nipissing at an elevation of 66 ft. above Georgian bay, making the total fall from the summit level of the waterway to Montreal harbor 630 ft. The total lockage from Georgian bay to Montreal will be 696 ft., less the amount of slope of the river between the locks, which will likely be from 40 ft. to 50 ft., making the aggregate of the lifts of all the locks about 650 ft. The lifts of the locks are for total fall on the route, without regard to the slope, for the reason that the water surface of the river at times of floods will require a greater height of lock walls and gates than would be needed for safe lockage, if no slope existed. It is proposed to take care of the 66-ft. rise from Georgian bay to Lake Nipissing with three locks so arranged in connection with regulating dams in the French river that the level of Lake Nipissing may be maintained at a little above its mean stage. French river is a series of deep narrow lakes separated by rapids, at which points most of the fall from lake to bay is concentrated. The banks of the river are of gneiss rock and so high and steep that the levels of the different reaches may be regulated at almost any desired elevation without material damage to adjacent lands. Lake Nipissing will constitute the source of water supply for lockage through the French river to Georgian bay and through the summit level cut and the Mattawa river to the Ottawa. The summit level will extend from lock No. 3 on the French river through Lake Nipissing, Trout lake, Turtle lake and Talon lake to lock No. 6 in the canal around Talon and Paresseux chutes, a distance of 69 miles. The summit level will be through a chain of beautiful lakes connected by short stretches of canal, and will be maintained at nearly a constant level by regulating works at either end. From the upper lock of the Paresseux canal down the Mattawa to its junction with the Ottawa, a distance of 14½ miles, there is a fall of 137 ft., which is to be taken care of with five locks. From the confluence of the Mattawa and Ottawa to Fort William, about 81 miles, the river is a series of deep narrow lakes separated by rapids having an aggregate fall of 145 ft., which it is proposed to overcome by the construction of seven locks. The Mattawa and Ottawa above Fort William have high steep banks, and can be regulated at such elevations of water surface that but little excavation will be needed except at the sites for locks and dams. From Fort William through the Culbute and Calumet channels to the head of Lake Des Chats (56 miles) the river falls 115 feet, and will require five locks. From Lake Des Chats the river falls 55 ft. at the Chats falls, requiring two locks, with which exception the river needs but little improvement between Cheneaux rapids and Deschenes rapids, a distance of 47 miles. From Lake Deschenes to the long reach of level river below Ottawa there will be a fall of 72 ft. requiring four locks.

"In the vicinity of and below the city of Ottawa, the existing water levels will not be materially changed, except to regulate the fluctuation of water levels so as to reduce range between high and low stages of the river. In the Grenville canal there will be a fall of 41 ft., requiring three locks; and in the Carillon canal a fall of 20 ft., to be overcome with one lock. At St. Anne's a lock with a 3-ft. lift will be required and in the Lachine canal there will be a fall of 45 ft., for which three locks will have to be provided. All of the structures for the entire route can be founded on rock in a most substantial manner, and the power necessary for operating locks, lighting and pumping, can be generated at small expense at the respective sites."

Mr. George Y. Wisner, the engineer in charge, says that the total distance from Georgian bay to Montreal by the route is 425 miles, of which 4 miles are taken up with locks, 40 miles of canal section 22 ft. deep with a bottom width of 100 ft., 74 miles of improved river channel with a bottom width of 300 ft., and 307 miles of open lake and river, suitable for 20-ft. navigation without further improvement. The cost to construct the waterway from Georgian bay to St. Anne's on the St. Lawrence river has been estimated at \$69,500,000 and from St. Anne's to Montreal at \$10,500,000, making a total of \$80,000,000.

### PHYSICAL FEATURES OF THE PROPOSED ROUTE.

In a description of the physical features of the route the report says: "It is an important geological fact that the outlet of Lakes Superior, Michigan and Huron was for thousands of years by the Georgian bay through the valley of the present Ottawa river, and that the completion of a deep-water channel along this route is merely in the direction of restoration of former natural conditions. An immense volume of water has in the past carved out the softer portions of the river channels, in the French, Mattawa and Ottawa rivers, often to immense depths. Thus the course of the waterway is, for the most part, practically a series of deep lakes separated by bars of rock at which cascades occur. These lakes, or lakelike expansions, afford a natural navigation of the highest class over the larger proportion of the route. The concentration of the descent in rapids or cascades in a series of steps with long intervening level stretches, minimizes the amount of canalling to be done, as in many cases no more than a simple lock is required. Added to this, over a great portion of the route the banks are bold and rocky, often precipitous, and the conditions every way favorable to the raising of existing water-levels by means of dams and the deepening of the channel thereby without having recourse to excavation. The existence of alternative channels at most of the large rapids on the Ottawa river will be of service in the execution of works to be constructed, and will be of importance in the regulation of the waters for navigation, and the preservation of structures during flood. Conditions dependent upon the state of settlement of the country are also most favorable. The present location of railways will permit supplies, material, stone for locks, cement, machinery, plant, etc., to be deposited within a short distance of any point on the whole route, and will not only lessen the cost of transportation but will permit work to be carried on along the

whole route simultaneously. The use of powerful explosives and the most modern appliances in dredging, excavating and construction machinery will lead to great savings in cost as compared with the methods in vogue at the time estimates of cost were made some years ago, and will offset to some extent the added cost of the larger scale of navigation.

"The need of the Ottawa waterway both as a through route and for the development of local resources is vastly greater than ever before. The marvelous growth of the western states and the Canadian northwest in the last quarter of a century and the consequent increase of commerce on the great lakes, have given rise to a freight traffic between the great lakes and the seaboard, already of enormous extent and rapidly increasing, such as must in the near future tax all possible means of transportation, and in the conveyance of which the Ottawa river route, owing to its superiority in point of shortness, cheapness, and safety must play a very important part. The vacant lands of the United States are now practically exhausted, and the tide of population has turned towards the almost limitless wheat areas of the Canadian northwest. Settlers are rapidly flocking into that country, and both its output of agricultural products and its requirements of manufactured goods will increase with great rapidity in the near future. It is for Eastern Canada to furnish transportation facilities for the former and to reap the benefit of the latter in extension of industries. Failure to realize and meet the needs of the northwest for cheap and adequate transportation can only result in the bulk of its exports going forward via the United States routes, and in its imports being almost wholly supplied from the states to its south, a result not only subversive of the commercial interests of Eastern Canada but destructive of community of interests between the various portions of the dominion, and therefore prejudicial to the national welfare.

"It has been stated that the northwest is capable of sustaining a population of at least 50,000,000. Last year in Manitoba 400,000 people raised 108,000,000 bushels of grain. Extensive car famines have already occurred, and the railways have proved inadequate to the task of moving existing wheat raised by a comparatively small population. With the growth of population and greatly increased production the difficulties must be intensely aggravated unless outlets of ample capacity are provided. Some indication of the relation of existing routes to the traffic potentialities of the great lakes may be gathered from the fact that the volume of grain business over the Ottawa and Parry Sound railway last year, drawn from both Lake Michigan and Lake Superior, was about one-sixtieth of the amount of the actual traffic through the Sault canals last year and that the traffic at the Sault has for some time past doubled about every six years. The saving to be effected by the deep waterway in the cost of transportation will directly benefit the producers of the northwest, will stimulate immigration into that portion of the dominion and be of incalculable value in the development of its resources.

"Large portions of the Ottawa valley and of Northern Ontario and Quebec possess valuable mineral and other resources as well as spruce and other timber in great commercial demand at the present time. For the purpose of stimulating and making more remunerative the lumber and mining industries in these districts, and of aiding and promoting the construction of railways to open up northward, no work could be undertaken comparable in importance with the canalization of the Ottawa river. The industrial future of Canada depends largely upon the working of its extensive deposits of iron. As the deep channel at the Sault has resulted in an output of 125,000,000 tons of ore from the American shores of Lake Superior in the last seventeen years, the Ottawa waterway will lead to an enormous increase in the iron raised in this part of Canada and will be of great importance in bringing it alongside the coal of Nova Scotia. Nova Scotia coal has hitherto not ascended the St. Lawrence to any extent above Montreal, to which point the shipments amount to 700,000 tons. The expense and loss incident to trans-shipment and the competition of American coal have prevented any further extension of the market for Canadian coal in this direction. A glance at the map, however, will show that the Ottawa waterway will give Canadian coal great advantage in competing with American coal. All the Lake Huron and Georgian bay ports are closer to Montreal by 400 miles by the Ottawa than by the St. Lawrence. The portion of Ontario stretching all the way from the Quebec boundary to the Manitoba boundary, including the richest mineral district of the province, will be served by the canal. Going up the St. Lawrence, Canadian coal directly meets the American competition. Every mile traveled west is a mile into the territory of American coal shippers, but a journey of 400 miles up the Ottawa brings the coal carrier within a few miles of Sudbury to the edge of possibly the greatest mineral area in Eastern Canada, and 200 miles more brings him to the Sault. There is also no reason why grain should not be taken from Fort William to Sydney. It could be stored there and shipped all the year round; would be 1,000 miles closer to Liverpool than it would be at New York, and the vessel could be sure of a return freight of coal.

"The opening of the Ottawa navigation as a through waterway is not only a commercial necessity but a measure of national and imperial importance. Of military importance as the only possible waterway between the great lakes and the Atlantic entirely within Canadian territory. Of national consequence as furnishing an additional bond and means of communication between widely removed portions of the dominion, carrying farther northward the line of settlement and the line of profitable commercial and industrial operations, and thus tending to add compactness to our territory and to cement together more firmly its parts. And of imperial value as part of the transcontinental transportation system, a link in the shortest possible highway between the granary of the northwest and the British market."

In 1901 the number of vessels passing through the Suez canal was 3,699 with an aggregate tonnage of 15,163,233, paying about \$20,000,000 in tolls. The largest traffic previously was in 1899—3,607 vessels and \$18,000,000 in tolls. All but 6 per cent. of the vessels passed without stopping at night and the average time in the canal was 18 hours and 41 minutes. Those which anchored at night were 30 hours and 19 minutes in the canal on the average. The electric lighting of the canal has thus increased the capacity of the canal about 40 per cent.

The Portland Steamship Co., International Steamship Co., Kennebec & Boston and Bath & Boothbay Steamship Co. have all been merged into the Eastern Steamship Co.

## PENNSYLVANIA STEEL CO.'S EARNINGS.

At its annual meeting this week the Pennsylvania Steel Co. made public a statement of earnings for the year ended Dec. 31. It shows net earnings from operation of \$2,879,272 to which there is added incidental receipts from rents, investments, etc., amounting to \$323,559, making a gross income from all sources of \$3,302,831. From this there is deducted interest on bonded and floating indebtedness amounting to \$550,113, leaving a net income for the year of \$2,652,718. There is written off for reserves and depreciation \$491,211, leaving what is called "Net gain of operations companies for 1901" of \$2,161,506. Out of this net gain the operating companies have paid dividends amounting to \$1,150,750, which has gone into the treasury. The balance remaining has been carried to the credit of the profit and loss accounts of the various companies. The amounts charged to depreciation, \$491,211.41 are felt by the management to be ample. In addition to this sum, \$253,662.93 has been expended on renewals and betterments, and charged to costs of operation. During the year many improvements and additions have been made or begun by the various corporations.

The company's balance sheet of April 10, 1902, shows:

ASSETS.	
Cash	\$680,767
Loans	266,606
Stocks and bonds	26,911,650
<b>Total assets</b>	<b>\$27,859,025</b>
LIABILITIES.	
Capital stock, preferred	\$16,500,000
Capital stock, common	10,750,000
Surplus	609,025
<b>Total liabilities</b>	<b>\$27,859,025</b>
Profit and loss account to April 10, 1902—	
Expenses	\$30,581
Net earnings	1,184,481
<b>Total</b>	<b>\$1,215,062</b>
Dividends paid Oct. 31, 1901	575,456
Surplus (out of which dividends payable May 1 has been declared)	609,025
	\$1,184,481
Dividends from companies and miscellaneous interest received	\$1,215,062
Net earnings brought down	1,184,481

Out of the net earnings, a dividend of 3½ per cent. was paid on the preferred stock Nov. 1, 1901, and a dividend of the same amount on the same class of stock has been declared payable May 1.

## ICE BREAKERS IN SIBERIA.

Mr. R. I. Greener, commercial agent at Vladivostock, has written to the state department at Washington a description of the ice-breaking steamers in Siberia and the service which they perform. He says:

Ten years ago, from the middle of November to the latter part of March, the port of Vladivostock was practically closed to the outer world. Mail came across from European Russia at long intervals by tarantass. The ice breaker Nadorshnie, or Reliable, was built at Copenhagen in 1896 and began work here in December, 1897, just as the railroad from Habarovsk to Vladivostock was completed. She is an iron steamer of 1,525 tons; 3,200 H.P.; four boilers; length, 198 ft.; breadth, 42½ ft.; and easily makes 5 knots in 6-in. ice. Besides ice breaking, she can be used as a life-saving craft, and can raise 1,700 tons of water in five hours. Active service with the boat usually begins at the end of November and lasts into March, varying, of course, with the severity of the season. The ice in Golden Horn harbor averages from 5 to 8 ft. The Nadorshnie breaks it to the depth of 7 ft., cutting it like cheese, and boasts of having been stopped but once, at a depth of 14 ft.

By the aid of this powerful steamer and her tenders, this harbor is kept open practically the entire year. The smaller boats, three in number, assist in keeping the ice broken near the wharves, and clear a passage eastward toward the docks and arsenals. A wrecking steamer formerly here is now at Port Arthur. The main channel here needs to be kept open only from 12 to 15 miles in the worst winters, when the thermometer registers 30° to 40° Réaumur. This winter, one of the coldest in many years, the largest vessels of the volunteer fleet and the new steamers of the Chinese Eastern flotilla have entered, anchored, and departed without trouble. The new steamer Kozu-Maru, from Tsuruga, northern Japan, is now daily expected, to open the new line, which will make direct connection with the Pacific coast. The Chinese Eastern railway fleet is interested in this line. It will run the year round, and will not be withdrawn during the winter months, like the fleet of the Nippon Yusen Kaisha. In summer, the Nadorshnie puts up for the usual repairs, which are slight.

She is always in commission and ready to render service as emergency dictates. She was paid for from the funds of the Great Siberian railroad. The intention is to have another steamer, larger and more powerful.

The ice breaker Baikal, used on Lake Baikal, is of the following dimensions: Length, 290 ft.; breadth, 57 ft.; draught, forward, 18 ft.; draught, aft, 20 ft.; speed, 12 knots; displacement, loaded, 4,200 tons. There are three triple-expansion engines of 1,250 H.P.; two engines abaft, separated by a fore-and-aft water-tight bulkhead, and one engine placed forward to turn the propeller and assist the ice breaker in cutting the ice. The propellers are all four-bladed. Fifteen cylinder-type boilers are placed in two compartments divided by a bulkhead. Water-ballast tanks form the double bottom. There are, besides, fore-and-aft ballast tanks; capacity of all tanks, 580 tons. The fore-and-aft ballast tanks are to put the steamer into position for crushing the ice. A steel belt runs around the water line. It is composed of sheets 1 in. in thickness, riveted from the inside. To obviate the damage from ice striking the sides at the water line, there are wooden wedges, on top of which logs are placed. This

wooden belt is 2 ft. thick. The Baikal resembles Nansen's Fram, except in the construction of bow and stern, which are so built that the Baikal can move forward or backward with equal facility while breaking the ice. Twenty-five loaded passenger cars can be placed on the main deck, where there are three pairs of rails. One hundred and fifty passengers can be accommodated in the cabin. The Baikal can cut ice 36 ft. thick. It is supposed to be the second largest ice breaker in the world, the Ermak being first.

The second boat, the Angara, is 195 ft. in length, 34 ft. broad, has a draught of 15 ft. and a speed of 12½ knots, triple-expansion engines of 1,250 I.H.P., four locomotive-type boilers; engines and boilers, separated by water-tight bulkheads. The Angara is mainly used to carry passengers. It was put into service in 1900. When the wooden floating dry dock, wharves and a gigantic pier are completed, the whole cost of the lake transportation may be estimated at 5,621,000 rubles (\$2,894,815). In December, 1900, the Baikal broke her propeller. When this happens, the Angara is not able to break the way herself. Ordinarily, she follows in the wake of the other. The difficulty in the winter transit of Lake Baikal lies in the fact that the entire surface is frozen solid. The broken ice can not be removed, and there is of course no tide to carry it away. The Baikal makes trips from December to April, and she has been known to be a week making the 46 miles across.

## THE PROSPECTUS AND AFTER.

While the following from Fairplay has no local application, still the principle involved is applicable to enterprises of more or less number which are peculiarly American. How many, many times has the glittering prospectus of the promoter been laid upon our desks and in what sad and solemn colors have the results been published:

"The discrepancy between the anticipations sometimes expressed in steamship prospectuses issued by the 'circularizing' class of ship owners and the results shown in working is strikingly exemplified in two documents forwarded by a correspondent. The first is the prospectus of an almost new steamer purchased towards the end of 1900; the second is the fourth voyage account of the said steamer issued last month. The prospectus was accompanied by a circular according to which some of the other boats controlled by the managing owners were earning at the rate of from 20 to 40 per cent. per annum. Proposing investors were therefore asked to 'kindly subscribe promptly' for shares in the new venture. The purchase price of the almost new steamer was just over £35,000, and it was stated in the prospectus that 'the cost of building' her 'would now be many thousands of pounds more than we are paying for her, and we question whether we could have delivery in twelve months, as the ship building yards are full up to 1902; but this vessel is an immediate investment, as she will be working for the company in March next (1901), making several voyages, with a return of some thousands of pounds to the shareholders, before a new vessel could be ready for sea.'

"The tone of the prospectus and its accompanying circular was that the new venture was a highly promising concern, and it was delicately hinted to investors that unless they applied for shares without delay they were likely (poor things) to be left out in the cold. So much for the invitation to invest. The accounts for the fourth voyage of the steamer have recently been issued. The boat had a freight of £780 odd with coal out, and £1,750 odd with grain home. The apparent profit on this round voyage, occupying about a fourth of a year, was only £8 and a few shillings. That is to say, that was the amount earned irrespective of interest on capital, depreciation, and possibly of eventual insurance calls or claims. The report states: 'It was most unfortunate that just as the boat commenced to work, and before having time to show good results, the freight market collapsed into such a low condition as made it almost impossible to work any steamer at a profit. [A collapse in freights being, apparently, the last thing that a circularizing ship owner regards as even a remote possibility.] Had the freights maintained anything near the level they were when this steamer's company was floated, unquestionably she would have done well for the shareholders. Although we are not able to declare a dividend with the present account, we think there is much room for congratulation that the vessel has so far been worked without losing money, when many other steamers must have lost several hundreds of pounds during the last few months.'

"There is more in the same strain in the report which prefaces the fourth voyage account, but enough has been quoted to show that the high hopes held out in the circular and prospectus of eighteen months or so ago are very far from having been realized. The shareholders are actually congratulated on the fact that the vessel has so far been worked without losing money. I share in the congratulations—if they are founded on fact; but how do the managers' own accounts come out, commissions and all oddments considered. My correspondent, who is an expert, gives it as his opinion that the steamer, which was purchased for a little over £35,000 a year and a half or so ago, could not now be sold for more than about £25,000, and he is doubtful whether she would fetch that figure—by perhaps a few thousands. If he is correct in this surmise, and he writes from wide experience, the shareholders have already lost a very considerable portion of their capital and it is difficult to see where the managers' 'room for congratulation' comes in. The difference between the capital of the company and the first cost of the steamer is 'covered by debentures bearing interest at 6 per cent. per annum . . . the excess of earnings on debentures over the interest will go towards their redemption, and when they are paid off the dividend on the subscribed capital will be increased, thus enhancing the value of the investment and keeping up the shares at a splendid valuation.'

"In other words the vessel was started with a load of debt on her which has to be paid off before the shareholders can flatter themselves that they own her. The interest on the mortgage would be a first charge on the earnings. Add that interest to the necessary allowance for depreciation, not to mention decline in value, and in my opinion having regard to the abnormal prices of steamers in the recent past, a dividend of even 20 per cent. per annum represents in such conditions no profit to the shareholders. In the case in point there is a decline in value of 30 per cent. in two years. Depreciation and interest in the same time would amount to another 20 per cent., and therefore unless the shareholders have received in dividends half of the original capital, they do not stand level on their investment. Besides, if the earnings are reduced to nil—or under—how is the mortgage to be met?"

## OUR IMPORTS AND EXPORTS.

### THE REPORTS INDICATE THAT WE ARE IMPORTING HEAVILY FOR MANUFACTURING PURPOSES—A VERY HEALTHFUL CONDITION.

A reduction of \$59,000,000 in exports and an increase of \$79,000,000 in imports do not seem to discourage the chief of the bureau of statistics with reference to the condition of the foreign commerce of the United States.

"I do not see that there is the slightest cause for anxiety," said Mr. Austin. "It is true that the value of our exports in the nine months ending with March is \$59,000,000 less than in the corresponding months of last year. Yet the causes of the reduction in the export figures are so clearly due to abnormal and temporary conditions that the falling off does not indicate a decrease in the popularity of American products abroad or a reduction in the demand for them. On the contrary, I think we may consider ourselves very fortunate that our export figures held up as well as they did."

"The chief reduction in our exports," continued Mr. Austin, "can be traced to the destruction of our corn crop by the drouth of last year. Corn has become so important a factor in our export trade, both in its natural state and in the condensed form of beef and pork, that a loss of one-fourth or one-third of the enormous crop means a great reduction in the surplus. In the last four years the exportation of corn has averaged about 200,000,000 bushels per annum. In the present fiscal year it will not amount to one-fifth of that quantity. In the nine months ending with March, 1902, the exportation of corn amounted to only 24,000,000 bushels, against 145,000,000 bushels in the corresponding months of last year. These are the preliminary figures, but they do not differ much from the completed figures which we shall have a fortnight hence. The value of the corn and corn meal exported in the past nine months was but \$15,000,000, against \$68,000,000 in the corresponding months of the preceding year."

"But that is not all of the effect of the loss of the corn crop. The shortage of corn at home has compelled many farmers to use a larger share of oats in the feed of their live stock, and as a result the value of the exportation of oats and oat meal in the nine months just ended was but \$4,500,000, against \$9,500,000 in the same months of last year. In these two items of corn and oats, in which the reduction is wholly due to the drouth of last year, the exportations have fallen \$57,000,000, while the total reduction in the value of all exports is but \$59,000,000."

"Another item which shows a material reduction in value of exports is cotton, yet this is wholly due to a fall in price abroad and not to a reduction in the quantity exported. On the contrary, exports have increased materially in quantity, although the value has fallen. The total exportation of cotton in the nine months ending with March was 3,074,568,421 lbs., against 2,740,568,107 lbs. in the same months of last year. This is an increase of 334,000,000 lbs; yet, owing to the reduction in price, the value is actually \$13,000,000 less than in the same months of last year, the figures for the nine months just ended being \$251,000,000, against \$264,000,000 in the same months of last year."

"Thus, in corn and oats, in which the reduction is wholly due to the drouth of last year, and in cotton, in which the reduction is due to a fall in prices abroad and not to a reduction in quantity exported, the reduction in value of exports amounts to \$70,000,000, while the grand total of exports shows a reduction of but \$59,000,000."

"Regarding the large increase of importations," continued Mr. Austin, "I see no cause for anxiety, but rather the reverse. We have not received the details of the March import figures; but judging from those of the preceding months, the increase is chiefly in manufacturers' raw materials. In the eight months ending with February the increase in manufacturers' materials imported was \$57,000,000, while the total increase of imports was but \$71,000,000; and it is probable that the details of the March figures when received will not materially change this condition in our import trade."

"At the risk of being considered a statistical Mark Tapley," concluded Mr. Austin, "I venture the assertion that there is nothing discouraging about the conditions on either side of our foreign commerce account. So long as the increase in importations is chiefly in articles which we cannot produce at home and indicates a growth in manufacturing, the increase will be welcomed by all; and so long as the reduction in exportations is due wholly to abnormal conditions, which may be looked upon as only temporary, we need feel no serious anxiety on that score, especially as we are still to have, even in this apparently adverse year, a favorable balance of trade of between \$400,000,000 and \$500,000,000."

## AROUND THE GREAT LAKES.

At a meeting of the directors of the Great Lakes Towing Co. in Cleveland, Wednesday, the regular quarterly dividend of 1 1/4 per cent. on the preferred stock was declared.

W. J. Farasey, agent for both the Lackawanna Green Bay line and the Rutland Transit Co. (Ogdensburg line) announces that the first boat of each of these lines bound up the lakes will leave Cleveland April 20.

Mitchell & Co.'s steamer Major, formerly the John Mitchell, has been chartered for a lump sum for the season by the Port Huron & Duluth Steamship Co. She will trade between Port Huron and the head of Lake Superior.

The Canadian Pacific proposes building a storage elevator of 1,000,000 bushels capacity at Port Arthur. It is understood that the Canadian Northern also proposes to increase its elevator capacity at that point by 1,500,000 bushels.

Two spar buoys will mark temporarily the shoal spot 1 1/4 miles off the harbor at South Chicago, on which the Steel Corporation steamer Rockefeller was stranded a few days ago. An effort will be made to have a gas buoy placed over this obstruction.

Thomas Dunford, well-known in connection with the operation of dry docks at Port Huron, died at his home Wednesday from injuries sustained a week ago in a runaway accident. Mr. Dunford started in dry dock and ship yard business some forty years ago with the firm of Leighton & Dunford. They built several wooden vessels and tugs. Del

Alverson then entered the business, the firm being known as Dunford & Alverson. After continuing for twenty years Mr. Alverson retired about a year ago, leaving Mr. Dunford sole owner.

It is understood that Mr. A. B. Wolvin and his associates in the new St. Lawrence river-Quebec transportation enterprise are not making the progress that was looked for in the beginning. They have succeeded in chartering seven or eight boats and will very probably begin business when the canal and river route from the upper lakes to Quebec is entirely open to navigation about a week hence, but they are disappointed in not getting some steel boats on which they were figuring.

The Ship Builders' & Calkers' National Union of America was organized in Toledo last week by the election of the following national officers: President, Joseph Dompier of Toledo; first vice president, John S. Nagell of Cleveland; second vice president, Michael Clark of Chicago; secretary, William H. Harder of Toledo; treasurer, R. W. Bailey of Cleveland. The first national convention of the union will be held in Cleveland July 1 of this year, at which time an effort will be made to establish a uniform scale of wages on the great lakes.

Gage records of the United States lake survey show the following mean stages of water for March, above mean sea level: Lake Superior, 601.41 ft.; Lakes Huron and Michigan, 579.27 ft.; and Lake Erie, 571.04 ft. These stages show Lake Superior to have been 0.31 ft. lower than during same month last year, and 0.14 ft. lower than in March, 1895; Lakes Huron and Michigan were 0.51 ft. lower than during same month last year, and 0.12 ft. lower than during March, 1895; Lake Erie was 0.07 ft. higher than during same month last year, and 0.06 ft. lower than during March, 1895.

Another of the steel steamers under construction at the works of the Craig company, Toledo, is in the water. The steamer Charles Beatty, building for Cleveland and Buffalo parties, was launched Wednesday and christened by Miss Katherine Morton, daughter of Capt. Edward Morton, of Cleveland. This steamer will be ready for service in about a month and will engage in the lumber trade. She is 220 ft. over all, 204 ft. keel, 40 ft. beam and 16 ft. depth, and is equipped with triple-expansion engines, having cylinders of 15, 25 and 42 in. diameter and 36 in. stroke. Two Scotch boilers of 11 by 10 ft. will supply steam at 175 lbs. pressure.

## AMONG SHIP BUILDERS OF THE GREAT LAKES.

Not half of the fleet of thirty-four large steel vessels, upon which the American Ship Building Co. has been at work since last fall, and which involve an expenditure of nearly \$10,000,000, have as yet been turned over to owners, so that the several yards of the company around the lakes are still almost as actively employed as they have been for a year past, and this condition will continue at nearly all of the works until the middle of the summer. The prospects for new orders are not, of course, as bright as they were some time ago, in view of a probable surplus of vessel capacity on the lakes, but officials of the company say they have witnessed the same conditions many times in the past, and have been themselves surprised beyond measure by a sudden turn in affairs. The next vessel to be launched will probably be the large freight steamer building at the Globe yard, Cleveland, for W. C. Richardson and others. It is expected she will be ready for launching about Saturday, April 26. The date has not, however, been definitely fixed as yet. Mr. Robert Wallace, senior of the Wallace family, will look after the transfer to the Atlantic seaboard of the two 7,000-ton tramp steamers for transatlantic trade which have just been completed at the Globe yard. One of the vessels will be taken in a few days in two parts to Quebec, where the sections are to be put together. The second vessel will follow shortly afterward. Both will be completely equipped before leaving Cleveland. Work at Quebec will consist only of putting the parts together. The contract for towing the ships in sections from the eastern end of the Welland canal to Quebec has been awarded to the George Hall Co. of Ogdensburg. Some one of the large upper-lake tugs will be engaged to tow the vessel parts down Lake Erie and through the Welland.

It is reported, but not as yet upon authority from the Bertram Engine Works Co., that that company, now operating works at Toronto, is to establish a ship yard at Port Burwell, Ont. A dispatch from a Canadian correspondent says: "The estimated cost is \$100,000. The land for the site has been bonded and contracts have been signed with the Tillsonburg & Port Burwell railway for the transportation of materials needed in the construction. Between 400 and 500 men will be employed on the work which will be commenced at once. No bonus was asked, but an arrangement was made with the Burwell council for a fixed assessment of \$10,000 for twenty years. It is understood that the company has a contract for building three large boats for lake traffic, too large to permit of their being made in Toronto and taken through the Welland canal."

The Collingwood Ship Building Co., Collingwood, Ont., is now quite actively engaged in the erection of new buildings. A railway siding has been laid to the works and a large amount of machinery will be installed as soon as the buildings are ready to receive it. The company has been delayed in building its dry dock owing to a controversy over water-front property. Dominion engineers are now looking into the matter. It is expected that the steamer Huronic will be launched from this yard on May 1.

It is learned on good authority that the Chesapeake & Ohio Steamship Co., which operates, in conjunction with the Chesapeake & Ohio railway, a line of steamships between Newport News and Liverpool and London, will sell its steamers Greenbrier, Appomatox and Chickahominy, which have been on the line for some years, and will have built three new steamships of much larger capacity to take their places. The steamships Lugano, Alleghany and Powhatan of Furness, Withy & Co.'s Virginia line, which also operates between Newport News and English ports, will take the places of the ships sold until the new vessels are completed. The Greenbrier, Appomatox and Chickahominy will go to Nova Scotian trade, it is said.

A Berlin dispatch announces that the navy department has made contracts with the Vulcan and Germania ship yards for two battleships, each of 13,000 tons displacement, which must be ready for service by 1906.

## RESTORATION OF LAKE LEVELS.

AN EXHAUSTIVE ARTICLE ON THE SUBJECT OF THE PROPOSED NIAGARA RIVER DAM, BASED UPON INFORMATION FROM MAJOR SYMONS OF BUFFALO, WHO HAS HAD MUCH TO DO WITH GOVERNMENT INVESTIGATIONS.

Major Thomas W. Symons of Buffalo is one of the members of the army engineer corps who has given special study to the subject of constructing a dam at the outlet of Lake Erie for the purpose of raising lake levels. Major Symons has had much to do with preparing for the war department information that has led Congressman Burton, chairman of the river and harbor committee, to make preparations for legislation regarding lake levels that will probably lead up to the construction of such a dam. An article on this subject, based upon information secured from Major Symons and published in a recent issue of the Buffalo Courier, is therefore of special interest. The article is as follows:

An engineering problem which has confronted the United States engineering corps for some years has been the accounting for the lowered water levels in all the great lakes, except Lake Superior, and to find some practical remedy for the resultant evils. Major Thomas W. Symons, widely known as the constructor of the five-mile breakwater before the Buffalo harbor, has come forward with a recommendation to the government of a plan. His project is to dam the Niagara river at the outlet of Lake Erie and build a ship canal for the vessels which have been using the river. The scheme is the most gigantic and far-reaching which has ever been undertaken in connection with inland waters and will affect the entire commerce and shore property interests of the great lakes. The primary engineering work, the damming of the Niagara river, is not a great feat from the engineer's point of view but the matters incident to this work give it its importance. The undertaking divides itself into three parts and each will make a big task for the engineers of the army. The first is the building of the dam, which must be over a mile wide on a variable base, part being shale, part limestone, part gravel; second, the construction of the ship channel, a length of four miles, and third, the avoiding of damages to property along the lake shore and in harbors and rivers by restoring the lake to its old level.

For many years, each time that a lake captain tried to run a 12-ft. boat through an 11-ft. channel and failed he has attributed the difficulty to the lowering of the lake level, so that the falling off of the water in the lakes has been a generally accepted fallacy for nearly forty years. It is only in the past fifteen years that the diminution has become real instead of fancied. A study of the chart showing mean monthly levels taken by the United States army engineering corps since 1860 and prepared under the charge of Major W. L. Fisk (this chart was recently published in the Marine Review), tells the story in a way that cannot be mistaken. It leaves no doubt but that the falling off in the water is due entirely to the deepening of the channel of Niagara river, the opening of the Welland canal and the Chicago drainage canal. The damming of the Niagara channel will go a long way, however, toward overcoming the effect of the other two. Lake Superior, which is beyond the effect of any of the factors named, has in it today water enough to bring the mean level above the sea to 603 ft., while forty years ago it was 602 ft., and in 1879 was 601 ft. From 1880 to 1890 the seasonable fluctuations of the level was almost identical, though that period saw very dry seasons and very wet seasons; also there was a great quantity of work done in clearing off forests and opening up swamps in the territory drained into it. This is almost proof conclusive that natural and artificial causes affecting the watershed have had little effect on the mean water level. Lakes Michigan and Huron having a full and uninterrupted connection in the Straits of Mackinac, have, of course, the same level, and during the same period underwent the same influences as Lake Superior, with the added effects of the factors named. The result speaks volumes, and leaves the conclusion obvious.

In 1860 the mean level above the sea was a few inches over 582 ft., and in 1870 was a few inches less, while the annual fluctuations were almost identical. In 1880 there had been a slight increase, and this increase was maintained at nearly 583 ft. until 1887-88, when the Welland canal was approaching completion, and then the water began to fall. The chart shows that in 1891 the mean level had dropped 4 ft., but the next three years saw a recovery of almost 2 ft., showing that the entire diminution was not due to the opening of the canal, but to seasonable fluctuations.

It was in 1895 that the work was completed which cleared the head of the Niagara river, and gave it an 18 ft. channel. There was taken from the crest of Horseshoe reef 31,000 cubic yards of rock and gravel. The current here is exceedingly swift and the work was executed with great difficulty. The top of the reef was blasted off for a width of 400 ft. in some places, lowering it 5 ft. in some two. The embedded gravel was dredged out, as well as such fragments of rock as were not swept down by the current. During the time that the opening up of the channel was going on, the level of the lake began slowly dropping, according to the chart, really not more than the seasonable falling off, but it failed to recover in the rise the next year. In 1887-88, at the time of the opening of the Welland canal, it had lost a foot, but now it continued to sink, so that in 1896 its mean level was 571 ft. above sea level, compared with 574.5 in 1887. Lake Superior had continued to rise meanwhile, and Lake Ontario was holding its own nicely at 246, which was only 6 in. below what it was forty years before, 6 in. higher than thirty years before, and a full foot higher than twenty years before. Since that time dredging in the St. Lawrence seems to have lowered the level a few inches.

The major portion of the falling off in the waters of Lakes Michigan, Huron and Erie has come in the past fifteen years. The Chicago drainage canal has been open for two years, and there has been a fluctuation of from 9 to 12 in. in the three lakes, but it is yet too early to say that it will be permanent, as it remains to be seen whether by June or July of this year the level shall have taken the seasonable rise sufficient to recover from the fall. It is the fixed belief of Major Symons of Buffalo and Major Fisk of Detroit that it will not and that the following months will see a still greater sinking of the level. It takes months for any such factor as a new outlet to produce its effect on so large a body as one of the great lakes.

Since it is palpable that the falling of the levels has been caused by the canals and the dredging out of the channel of the Niagara, Major

Symons has concluded that the remedy is the undoing of the evil. Since that harm to shipping has been almost entirely confined to Lake Erie, and since the Welland canal affected Lakes Huron and Michigan as it did, he believes that the changing of conditions in Lake Erie will attain the greater portion of the desired ends and incidentally restore a part of the lost water to Lakes Huron and Michigan, for it is reasonable to suppose that if the lowering of the level of Lake Erie by the Welland canal should so greatly affect the other two lakes the restoration by damming Niagara would be found in all three. The raised level would have an effect at the upper entrance of the Welland canal, which the Canadian government would in all probability meet and still further aid the project as Canadian harbors and shipping would be equally benefited with American.

The dam in Niagara river would be of rubble stone work, with a long, upper angle and steel anchors on account of the ice and current, and would be about 2,000 yards in length. The beginning at the American shore would be just below the entrance to the Erie basin, and the line of direction would be directly across stream, 400 yards below the Horseshoe reef light to a point on the Canadian shore in line with the historic ruins of Fort Erie. The height is as yet undetermined, but Maj. Symons thinks it would be sufficient to cause a considerable fall. This would make a beautiful spectacle in the winter season. The ship canal would, of course, be an essential to allow vessels to proceed down the river, which they could do by means of the canal to the quiet waters of Strawberry island and at the head of Grand island. At the present time along the shore of Fort Porter there runs the Erie canal, with the Black Rock canal beside it, giving access to the sheltered waters behind Squaw island. The levels are the same, so the ship canal project includes the combination of the two to the end of the Black Rock canal and the widening of the Erie canal from that point on.

Since the canal would be a considerable link and a good beginning, should the government at some future time determine to build a ship canal around Niagara on the American side, it would be foolish to limit it to anything less than a size which would accommodate the largest vessels of the high seas. The waterway at the Sault barely accommodates some of the largest lake boats. This canal should be at least 125 ft. in width and 25 ft. in depth. The Erie canal could be locked into it at the lower end, which would be a considerable improvement in that waterway's western terminal. The greatest argument for these improvements is, as has been said, the rapidly increasing loss to shipping on the three lakes affected. It is impossible, of course, to show the exact ratio of these losses.

## OF INTEREST TO SHIP BUILDERS.

Representative Naphen has introduced a bill in the house of representatives which is of interest to ship builders. It amends the Dingley bill and provides that "all materials of foreign production, and all materials or articles of domestic production procured and purchased in the foreign markets, which may be necessary for the construction of vessels built in the United States for foreign account and ownership, or for the purpose of being employed in the foreign trade, including the trade between the Atlantic and Pacific ports of the United States, and all materials of foreign or domestic production necessary for the building of their machinery, and for their output and equipment, may be imported in bond under such regulations as the secretary of the treasury may prescribe, and upon proof that such materials have been used for such purposes, no duties shall be paid thereon. But vessels receiving the benefit of this section shall not be allowed to engage in the coastwise trade of the United States more than two months in any one year, except upon the payment to the United States of the duties of which a rebate is herein allowed."

The bill also provides that vessels built in the United States for foreign account and ownership shall not be allowed to engage in the coastwise trade of the United States. It further provides that all materials of foreign or domestic production purchased in foreign markets for the repair of American vessels engaged in foreign trade may be withdrawn from bonded warehouse free of duty.

## OPERATIONS AT FORE RIVER WORKS.

Quincy, Mass., April 16.—Six of the nine bents of the Fore River Ship & Engine Co.'s new steel shophouse at Quincy, Mass., being completed the structure was brought into use last week. Three of the traveling cranes which are to serve it are in place and the fourth is ready to be hoisted into position. The completing of the remainder of the shophouse continues without interruption, while the construction of the battleships New Jersey and Rhode Island has been started amidships and will go toward the bow. It is expected that before the forward parts of these vessels are sufficiently under way to leave the traveling cranes free a part of the time, the rest of the shophouse will be finished and the building of the vessels can be carried from amidships toward the stern. Two gravity railroads connect the shophouse with the various shops of the Fore River works.

The painting of the upper works of the cruiser Des Moines has been finished and the sheathing is nearly done. The cruiser's compartments have been tested and the final work of preparing her for launching is now to be put under way. Most of the Des Moines' brasswork has been finished at the company's foundry, and some of it has already been used in the ship's construction.

It has been definitely decided to give to the seven-masted steel schooner building at these works the name of Thomas W. Lawson, in spite of the fact that the superstitious may be prejudiced by its thirteen letters. Mr. Lawson is one of the large owners of the vessel. Two of the steel lower masts for the Lawson have been finished and seven of the great Oregon pine spars are ready. The plating on the vessel's hull is three-quarters done and she is entirely decked in.

The Fore River company has signed a contract to build a new iron structure with a 100-ft. draw, in place of the old Weymouth Fore River bridge at Quincy point. The old wooden bridge was constructed early in the last century and is one of the most famous in the state.

The enlisted force of the navy is increased 3,000 men by the naval appropriation bill reported in the rough by a sub-committee to the naval committee. As yet the most important item, that of new ships, has not been considered.

## OFFICERS OF LAKE VESSELS FOR 1902.

## RICHELIEU &amp; ONTARIO NAVIGATION CO., MONTREAL, CAN.

Str. Quebec	Capt. L. O. Boucher	Engr. F. Gendron
" Montreal	"	" F. H. Hamelin
" Beaupre	" L. St. Louis	" E. Arcand
" Berthier	" Chas. Gouin	" E. Denis
" Corsican	" D. Mills	" Wm. Parker
" Hamilton	" A. J. Baker	" R. J. Marshall
" Spartan	" J. McGrath	" J. Kane
" Terrebonne	" Chas. Laviolette	" Beaudoin
" Lapraire	" P. McLean	" A. D. Marteguy
" Chambly	" J. A. G. Paulet	" E. Gendron
" Hochelaga	" H. Mandeville	" B. Pintal
" Columbian	" C. Hinckley	" Jas. Conlin
" Bohemian	" A. Dunlop	" Geo. Gendron
" Kingston	" H. Esford	" A. R. Milne
" Toronto	" E. A. Booth, Jr.	" W. A. Black
" Three Rivers	" F. St. Louis	" Jno. Matte
" Longueuil	" F. Jodoin	" H. Noel
" Saguenay	" A. Fortin	" Beaudoin
" Canada	" Chas. LaPierre	" Jos. Hamelin
" Carolina	" Geo. Riverin	" M. Latulippe
" Hasamea	" D. Morgen	"
" Sorel	" Jos. Faubert	" E. Beauchage
" Mouche a Feu	" F. Crepeau	" T. Mathieu
" Cultivateur	" Jos. Gouin	"

## KELLEY ISLAND LIME &amp; TRANSPORT CO., CLEVELAND.

Str. Albert Y. Gowen	Capt. Chas. Smith	Engr. Chas. C. Smith
" A. S. Chisholm	" D. Henderson	" H. Eardsley, Sr.
" Isabella J. Boyce	" G. E. Benham	" Alex. McLea
" Desmond	" Alfred Dixon	" D. Conway
" Norma	" W. P. Wheeler	" J. D. Magnussen
Schr. David Moran	" H. A. Smith	"
" Fannie Neil	" W. A. Fetterly	"
" Ohio	Handled by tug.	"

## BOOTH &amp; CO., A., CHICAGO.

Str. Argo	Capt. E. S. Smith	Engr. J. E. Evans
" America	" J. T. Hector	"
" S. B. Barker	"	"
" Hunter	"	"
Tug Hiram R. Dixon	"	"

## HAWGOOD, &amp; CO., W. A., CLEVELAND.

Str. Bransford	Capt. James Owen	Engr. J. N. Chapman
" J. M. Jenks	" J. F. Ahlstrom	" Jas. Norton
" H. B. Nye	" Alva Keller	" B. F. Butler
" Iosco	" Nelson Gonyau	" W. H. Dibble
Schr. Olive-Jeanette	"	" Henry Coombs

## CANADA ATLANTIC TRANSIT CO.,

## Geo. J. Harris, Gen. Western Agt., Chicago.

Str. Geo. N. Orr	Capt. Wm. Baxter	Engr. H. H. Evans
" Arthur Orr	" H. Jaenke	" J. Murnan
" Yale	" Jas. Jackson	" H. Scott
" Ottawa	" A. Birnie	"
" Kearsarge	" Wm. McDowell	" Jas. Cummings

## SOPER LUMBER CO., CHICAGO.

Str. Albert Soper	Capt. Jas. Hogan	Engr. F. Grenell
" J. H. Prentice	" R. G. Evans	" F. R. Winkle
Schr. Middlesex	" P. T. Wiemar	"
" Halsted	" Jno. Lundberg	"

## GILCHRIST &amp; CO., C. P., MANAGERS, CLEVELAND.

Str. E. S. Pease	Capt. Thos. Sloane	Engr. Geo. Reed
" H. B. Tuttle	" H. R. Boles	" Jno. Stolder
Schr. Planet	" Frank Moore	"
" Canton	" F. A. Pitcher	"

## CALUMET TRANSPORTATION CO., HANNA, D. R., MGR., CLEVELAND.

Str. Geo. A. Flagg	Capt. R. O'Connor	Engr. B. H. Gillmore
" R. S. Warner	" Martin Johnson	" E. Donaldson
Schr. S. D. Warriner	" F. T. Harlow	"
" A. W. Thompson	" M. Anderson	"

## PAULY, H. J., MILWAUKEE.

Str. Thos. Davidson	Capt. Jno. McMillan	Engr. Jno. McMillan
" Thos. Vail	" H. Oerking	" Thos. Martin
Schr. Aberdeen	"	"
" Baltic	"	"

## MADDEN, T. F., BAY CITY, MICH.

Str. Lizzie Madden	Capt. D. Elliott	Engr. Casey Cuthbert
Schr. Noquebay	" P. Ryan	"
" Mautenee	" Andrew Bigger	"

## CHESBROUGH, F. B., EMERSON, MICH.

Str. Kennebec	Capt. L. W. Roberts	Engr. F. Goodwin
" Kanawha	" C. M. Haight	" Geo. Miller
" Peshtigo	" J. Hay	" E. Manion

## SAGINAW BAY TRANSPORTATION CO., CLEVELAND.

Str. Rhoda Emily	Capt. Jos. Albano	Engr. Jos. D. Budd
" Geo. Dunbar	" Jno. Little	" Jno. Brown
Schr. Hattie	" A. D. Sheldon	"

WEST DIVISION STEAMSHIP CO. (D. SULLIVAN & CO., MGRS.) CHICAGO.	Capt. D. C. Sullivan	Engr. .
" W. H. Wolf	" Wm. Lund	"

## MILLS, JOHN E., MANAGING OWNER, PORT HURON, MICH.

Str. Argonaut	Capt. Geo. Bennett	Engr. .
" H. J. Kendall	" H. J. Kendall	"
" Thos. R. Scott	" Paul Rivard	"

## TOMLINSON, G. A., BOARD OF TRADE, DULUTH.

Str. Sultana	Capt. W. E. Clarke	Engr. A. J. Wilson
" Sonora	" F. A. Fick	" T. H. Welsh

## WHITNEY, D. C., DETROIT.

Str. Nipigon	Capt. Jas. Hays	Engr. Irvin Morrison
Schr. Melbourne	" S. Grandee	"

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Str. Meriden	Capt. B. W. Morgan	Engr. C. Johnson
Schr. J. C. Magill	" Jno. Morgan	"

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Str. Chas. McVea	Capt. Wm. Turnbull	Engr. H. Bender
" Saugatuck	" Jno. Campbell	" A. Deming

## FRANKLIN TRANS. CO., HANNA, D. R., MGR., CLEVELAND.

Str. Wm. F. F. Fitch	Capt. Wm. Cummings	Engr. .
Schr. Alex. Maitland	"	"

## SMITH, L. A., ECORSE, MICH.

Owes steamer Porter

# MARINE REVIEW

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## New Offices of the Marine Review.

More office space has been needed by this company for some time past, but on account of the crowded condition of the Perry-Payne building, Cleveland, where we have been located for twelve years, it could not be secured in that building. The offices were therefore moved on April 1 to the Wade building, just across Superior street from the Perry-Payne, where enlarged quarters have been fittingly arranged.

The Marine Review Pub. Co.

Mr. Andrew Carnegie's new book, "The Empire of Business," is being well advertised throughout the country, and while the book is not yet from the press advance sheets have been liberally distributed. Anything that Mr. Carnegie says is interesting. True, he pronounces a lot of platitudes, but so delightfully as to make entertaining reading. We find nothing new in the book. It is a collection of essays and addresses which have been written and delivered by Mr. Carnegie during the past fifteen years. The fact that he incorporates in the collection speeches delivered as long ago as 1885 shows that his views have undergone no change. Mr. Carnegie's views are very interesting; they are not especially profound. They are helpful because they are optimistic, but one must not read what Mr. Carnegie says with the hope that he can go and do likewise, because it is an almost certain shot that he cannot. There is no formulae for the production either of millionaires or centenarians. One man becomes a centenarian, so he tells a breathless world, because he has never used tobacco, while another centenarian ascribes his longevity to the fact that he has never failed to use the weed every day. It's all a matter of the personal equation. We are sorry that Mr. Carnegie has not definitely added a twentieth-century chapter to the book. Perhaps he has, but the advance sheets give no indication of it. Much has happened during the past year or two in which Mr. Carnegie has been, as it were, the storm center, and a new crop of reflections and observations from him would prove interesting. The first chapter, "The Road to Business Success," is from an address to students in a Pittsburgh commercial college, delivered in 1885. It sounds a note that is continually repeated throughout the book—that there is plenty of opportunity for advancement of the right sort of young men in the business conditions of today. He says:

"Assuming you are safe in regard to these your gravest dangers, the question now is how to rise from the subordinate position we have imagined you in, through the successive grades to the position for which you are, in my opinion, and I trust, in your own, evidently intended. I can give you the secret. It lies mainly in this: Instead of the question, 'What must I do for my employer?' substitute 'What can I do?' Faithful and conscientious discharge of the duties assigned you is all very well, but the verdict in such cases generally is that you perform your present duties so well that you had better continue performing them. Now, young gentlemen, this will not do. It will not do for the coming partners. There must be something beyond this. We make clerks, bookkeepers, treasurers, bank tellers of this class, and there they remain to the end of the chapter. The rising man must do something exceptional, and beyond the range of his special department. He must attract attention. As a shipping clerk, he may do so by discovering in an invoice an error with which he has nothing to do, and which has escaped the attention of the proper party. If a weighing clerk, he may save the firm by doubting the adjustment of the scales and having them corrected, even if this be the province of the master mechanic. If a messenger boy even, he can lay the seed of promotion by going beyond the letter of his instructions in order to secure the desired reply. There is no service so low and simple, neither any so high, in which the young man of ability and willing disposition cannot readily and almost daily prove himself capable of greater trust and usefulness, and, what is equally important, show his invincible determination to rise. Some day, in your own department, you will be directed to do or say something which you know will prove disadvantageous to the interest of the firm. Here is your chance. Stand up like a man and say so. Say it boldly, and give your reasons, and thus prove to your employer that, while his thoughts have been engaged upon other matters, you have been studying during hours when perhaps he thought you asleep how to advance his interests. You may be right or you may be wrong, but in either case you have gained the first condition of success. You have attracted attention. One false axiom you will often hear, which I wish to guard you against: 'Obey orders if you break owners.' Don't you do it. This is no rule for you to follow. Always break orders to save owners. There never was a great character who did not sometimes smash the routine regulations and make new ones for himself. The rule is only suitable for such as have no aspirations, and you have not forgotten that you are destined to be owners and to make orders and break orders. You will never be a partner unless you know the business of your department far better than the owners possibly can. Boss your boss just as soon as you can; try it on early. There is nothing he will like so well if he is the

right kind of boss; if he is not, he is not the man for you to remain with—leave him whenever you can, even at a present sacrifice, and find one capable of discerning genius. Our young partners in Carnegie Bros. have won their spurs by showing that we did not know half as well what was wanted as they did. Some of them have acted upon occasion with me as if they owned the firm and I was but some airy New Yorker presuming to advise upon what I knew very little about. Well, they are not interfered with much now. They were the true bosses—the very men we were looking for."

In the "A, B, C of Money" Mr. Carnegie becomes delightfully entertaining. His advocacy of the gold basis is perfectly sound and his style charmingly colloquial. The author imagines himself frequently interrupted by more or less pertinent questions which he proceeds to answer. In discussing "The Common Interests of Capital and Labor" he is at his best. Here his temperamental optimism bursts into full bloom. His facts are interesting and the conclusions he draws from them are those which the thoughtful wage-earner can ponder with most profit. The masses do not originate thoughts; rather they imbibe impressions and it is here that Mr. Carnegie's book is distinctly useful. On the subject of books, he says:

"The severe study of scientific books must not be permitted to exclude the equally important duty of reading the masters in literature; and by all means of fiction. The feeling which prevails in some quarters against fiction is, in my opinion, only a prejudice. I know that some, indeed most, of the most eminent men find in a good work of fiction one of the best means of enjoyment and of rest. When exhausted in mind and body, and especially in mind, nothing is so beneficial to them as to read a good novel. It is no disparagement of free libraries that most of the works read are works of fiction. On the contrary, it is doubtful if any other form of literature would so well serve the important end of lifting hard working men out of the prosaic and routine duties of life. The works of Scott, Thackeray, Eliot, Dickens, Hawthorne and others of the same class are not to be rated below any other form of literature for working-men."

Mr. Carnegie's views as to collegiate education are well known. That they have not changed is evidenced by the fact that the chapter bearing upon them was written in 1890. He says:

"I asked a city banker to give me a few names of presidents and vice-presidents and cashiers of our great New York city banks who had begun as boys or clerks. He sent me thirty-six names and wrote he would send me more next day. The absence of the college graduate in this list should be deeply weighed. I have inquired and searched everywhere in all quarters, but find small trace of him as the leader in affairs, although not seldom occupying positions of trust in financial institutions. Nor is this surprising. The prize takers have too many years the start of the graduate; they have entered the race invariably in their teens, in the most valuable of all the years for learning—from fourteen to twenty; while the college student has been learning a little about the barbarous and petty squabbles of a far distant past, or trying to master languages which are dead, such knowledge as seems adapted for life upon another planet than this as far as business affairs are concerned, the future captain of industry is hotly engaged in the school of experience, obtaining the very knowledge required for his future triumphs. I do not speak of the effect of college education upon young men training for the learned professions, for which it is, up to a certain point, almost indispensable in our day for the average youth, but the almost total absence of the graduate from high position in the business world seems to justify the conclusion that college education as it exists seems almost fatal to success in that domain."

Mr. Carnegie, however, is careful to qualify this sweeping statement. We are glad that he does so. If the acquisition of money is the meaning of life a collegiate education is, of course, unnecessary. It merely increases a person's wants, that is his capacity of appreciation, without increasing his earning power. However, we take it that he who has so enriched his mind as to drink in the multifold beauties of nature and art lives in a world into which the mere millionaire cannot enter. Some of the greatest failures living are our millionaires. Mr. Carnegie says:

"Lest anything here said may be construed as tending to decry or disparage university education, let me clearly state that those addressed are the fortunate poor young men who have to earn a living; for such as can afford to obtain a university degree and have means sufficient to insure a livelihood the writer is the last man to advise its rejection—compared with which all the pecuniary gains of the multi-millionaire are dross—but for poor youth the earning of a competence is a duty, and duty done is worth more even than university education, precious as that is. Liberal education gives a man who really absorbs it higher tastes and aims than the acquisition of wealth, and a world to enjoy, into which the mere millionaire cannot enter; to find therefore that it is not the best training for business is to prove its claim to a higher domain."

He still further qualifies it in an address entitled "Business," which was delivered at Cornell university in 1896.

"Unless the young university man employs his time to the very best advantage in acquiring knowledge upon the pursuit which he is to make the chief business of his life, he will enter business at a disadvantage with younger men who enter in their teens, although lacking in university education. This goes without saying. Now, the question is: Will the graduate who has dwelt in the region of theory overtake the man who has been for a year or two in advance of him, engaged in the hard and stern educational field of practice? That it is possible for the graduate to do so also goes without saying, and that he should in after life possess views broader than the ordinary business man, deprived of university education, is also certain, and, of course, the race in life is to those whose record is best at the end; the beginning is forgotten and is of no moment. But if the graduate is ever to overtake the first starter in the race, it must be by possessing stronger staying powers; his superior knowledge leading to sounder judgment must be depended upon to win the race at the finish. The exceptional graduate should excel the exceptional non-graduate. He has more education, and education will always tell, the other qualities

being equal. Take two men of equal natural ability, energy, and the same ambition and characteristics, and the man who has received the best, widest, most suitable education has the advantage over the other, undoubtedly."

It is interesting to recur to Mr. Carnegie's well-known views as to the uses of wealth and its distribution, now that he has begun to practice his preachers so vigorously. In "Wealth and Its Uses," a lecture delivered at Union college, he described as the usual methods the willing of it at death to the family and the bequest of it to institutions. He goes on to describe "the third use and the only noble use of surplus wealth":

"That it be regarded as a sacred trust to be administered by its possessor, into whose hands it flows, for the highest good of the people. I have often said, and I now repeat, that the day is coming, and already we see its dawn, in which the man who dies possessed of millions of available wealth which was free and in his hands ready to be distributed, will die disgraced. The epitaph which every rich man should wish himself justly entitled to is that seen upon the monument to Pitt:

'He lived without ostentation,

And he died poor.'

"Such is the man whom the future is to honor, while he who dies in old age retired from business, possessed of millions of available wealth, is to die unwept, unhonored and unsung."

The title of the chapter on "The Bugaboo of Trusts" implies Mr. Carnegie's belief that there is no danger impending from industrial combination. He thus formulates it:

"Given freedom of competition, and all combinations or trusts that attempt to exact from the consumer more than a legitimate return upon capital and services write the charter of their own defeat. We have many proofs that this great law does not sleep, and that it will not be suppressed. The fashion of trusts has but a short season longer to run, and then some other equally vain device may be expected to appear when the next period of depression arrives; but there is not the slightest danger that serious injury can result to the sound principles of business from any or all of these movements. The only people who have reason to fear trusts are those foolish enough to enter into them. The consumer and the transporter, not the manufacturer and the railway owner, are to reap the harvest."

In a recent speech delivered in New York city on the subject "Railroads Past and Present," Mr. Carnegie tells how he went into the railway business. He says:

"When I had the honor to become a railroad man the Pennsylvania railroad was not yet finished to Pittsburgh. By means of some miles of staging between two points, and a climb over the mountains by means of ten inclined planes, the passenger was enabled to reach Philadelphia by rail. The rails on the mountains were iron, 14-ft. lengths, imported from England, lying on huge hewn blocks of stone, although the line passed through woods and ties would have cost little. The company had no telegraph line, and was dependent upon the use of the Western Union wire. Mr. Scott, the superintendent, the celebrated Thomas A. Scott who was afterward president, often came to the telegraph office in Pittsburgh to talk to his superior in Altoona, the general superintendent. I was then a young operator, and made his acquaintance by doing his telegraphing for him. I was receiving the enormous salary of \$25 a month then, and he offered me \$35 to become his secretary and telegrapher, which meant fortune. Let me congratulate you upon the great advance in your own wages and salaries since then. Mr. Scott received \$125 a month—\$1,500 a year—and my wonder was what a man could do with that amount of money. I hadn't thought then of one use—he might succeed by giving part of it away. What are the advantages a man receives from wealth is often discussed, but the best of wealth is not what it does for the owner, but what it enables him to do for others. I served for some time before I received an advance of salary of \$10 a month. That gave me an enormous revenue compared with the \$1.20 a week at which I started in the cotton factory."

He also gives this sage advice to business men: "The concerns which fail are those which have scattered their capital, which means that they have scattered their brains, also. They have investments in this, or that, or the other, here, there and everywhere. 'Don't put all your eggs in one basket' is all wrong. I tell you 'put all your eggs in one basket, and then watch that basket.' Look round you and take notice; men who do that do not often fail. It is easy to watch and carry the one basket. It is trying to carry too many baskets, that breaks most eggs in this country. He who carries three baskets must put one on his head, which is apt to tumble and trip him up. One fault of the American business man is lack of concentration."

It is a very unfortunate circumstance, and one which the Review regrets exceedingly, that there should be such a division of opinion between Senator Hanna and Representative Burton on two important measures which are now before congress—the river and harbor bill and the shipping bill. Both of these men—each a leader in the respective body of which he is a member—are from Cleveland. They are both from the great lakes district and that district must inevitably suffer from a clash of opinion between these two men. We fear, indeed, that it has gone beyond a clash of opinion and has reached the stage of actual hostility. But it is solely with its commercial significance that we are concerned. A division of opinion between these two men can do incalculable injury to commerce. We will not enter into its minor manifestation, which is purely of local interest, that of extending the Cleveland breakwater to Case avenue or to Gordon park, but will view it in its broader aspect. We know nine reasons why that breakwater should not be extended beyond Case avenue, and we know nine reasons why it should be extended to Gordon park. Last year, as the direct and traceable outgrowth of a difference between these two men, the river and harbor bill was defeated. Thanks to the continuing contract system the injury was more apparent than real. But

the river and harbor bill could not be defeated this year without doing positive hurt to the country's commerce. We have no sympathy with the cry of "pork" raised against appropriations which are intended for the improvement of waterways of commerce. We are not in favor of the expenditure of a single penny by the general government for the improvement of a non-navigable stream, but we hold that those improvements which permit the cheaper interchange of the products of the field and factory through the medium of natural waterways are legitimately the nation's expense. They tend to cheapen the cost of living, to add to the purchasing power of the workman's dollar. There may be appropriations in the river and harbor bill which are not warranted by circumstance, but it must be left to the integrity of the committee to cull them. We believe Senator Hanna and Representative Burton to be uncompromisingly honest men; and we believe, too, that there are none abler in congress. The river and harbor bill has passed the house and is now in the senate, where it has been subjected to a few amendments. It is hoped that it will be passed substantially as it came from the house. It is held by some that Mr. Burton's views on the shipping bill has had something to do with the buffeted career of the river and harbor bill. We really do not know what Mr. Burton's views on the shipping bill are, but we think that his opposition to that measure has been greatly magnified by the newspapers. We doubt very much whether he would have spoken against the measure and we question whether he would have voted against it. He might, indeed, not have voted for it. The shipping bill has passed the senate and could be easily put through the house by a friendly speaker. There seems little probability, however, of Mr. Henderson taking a direct interest in it. The present thing to do is to obtain unity of action on the river and harbor bill and then to put the shipping bill on the calendar.

#### PENSIONING THE LIFE SAVING SERVICE.

The house committee on interstate and foreign commerce will soon take up the senate bill to increase the compensation for district superintendents in the life saving service to \$2,000 a year with an additional \$500 for the hire of a clerk in cases where the secretary of the treasury deems it necessary for any superintendent to employ one. The service is now divided into thirteen districts under the management of the superintendent, who, in his turn, is responsible directly to the authorities at Washington. The salaries of superintendents vary from \$1,500 in the eighth district to \$1,800 in the fourth, fifth, seventh, tenth, eleventh, twelfth and thirteenth districts. The property alone intrusted to some of these men is of considerable value, and not always the largest amount is in the hands of the best-paid superintendent. In the fifth district, for instance, there are forty-two stations, and in the fourth thirty-three; but in the second and seventh there are thirty-one each, yet the pay of the superintendents of these two is respectively \$1,600 and \$1,800, while two superintendents who manage only eight stations each get \$1,600, and another who manages twelve gets \$1,800. This disparity seems to rest on no better basis than favoritism or chance. Besides the property which is intrusted to the care of the superintendents, the risk of human life and the discipline involved in the control of large bodies of subordinates is an important consideration. The average number of subordinates under command of a superintendent is 161, but in one district the actual number reaches 329. The increase of technical facilities has made the work much more intricate and exacting, and along with other advances the mere clerical labor of conducting a superintendent's office has grown remarkably during the last ten years. Some of the superintendents have to hire clerks, paying the salaries out of their own pockets, in order to be able to give proper attention to the physical labor required in making the rounds, keeping track of the equipment, overseeing drills, and the like. When it is remembered that one superintendent has to cover a distance of 1,000 miles or more on every quarterly tour, and that six of his fourteen stations are on islands distant from two and one-half to nine miles off shore, and are difficult to reach at all times, and especially in winter, it must be plain that such a place is in no danger of becoming a sinecure. Add to this the fact that superintendents are required to furnish bonds, in certain instances running as high as \$50,000, and the situation becomes still less attractive. It certainly does not appear that \$2,000, or even \$2,500, where clerk hire has to be paid, is an extravagant compensation.

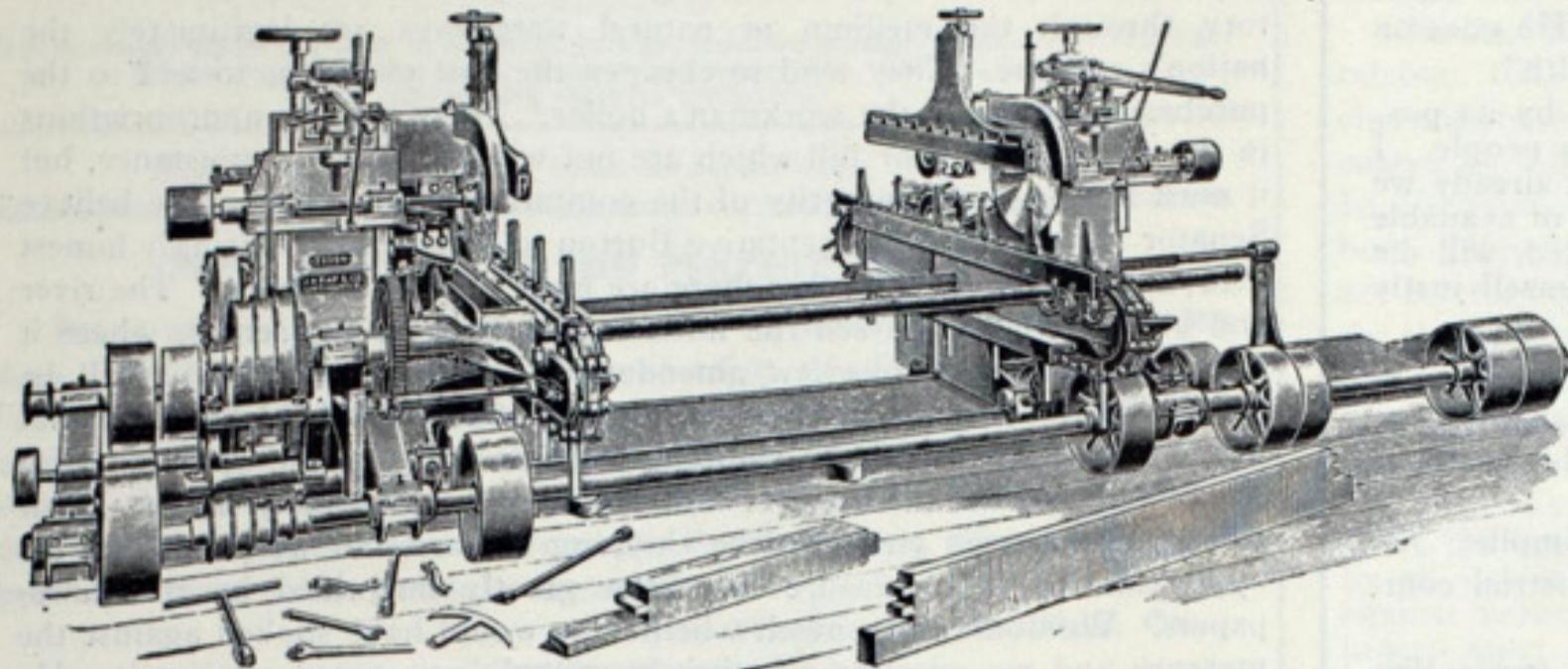
Before the committee tackles the superintendent's salary bill, it will have a hearing on another bill which has not yet passed either house, providing for pensions in the life saving service corresponding to those in the military and naval services. Senators Hoar and McMillan and Representatives Lovering and Green of Massachusetts have shown themselves especially active in the effort to procure such legislation, which has already found favor in quarters where a civil pension list of any ordinary sort is usually considered a terrible bugbear. Even some of the members of the house who have most vigorously resisted every effort to introduce a pension system into the revenue marine service have offered their support to a measure in behalf of the life-savers. One reason for this may be found in the recent disaster at Monomoy, Mass., where all but one of the brave fellows who went to the rescue of the wrecked mariners were lost. This case brought home to every one most vividly the perils daily and nightly faced by the life saving crews during the storm season, and which call for heroic qualities unassisted by dramatic surroundings. The Monomoy disaster was only one of many incidents of like character in the annals of the life saving service, but in one way and another attracted more attention. W. H. Mack of Cleveland lost his life in this disaster, a loss acutely felt in the great lakes district, and petitions are now in circulation about the lakes imploring congress to pension the life-savers.

The Japanese are showing great energy in the development of their mercantile marine. A steady increase is taking place in the number and tonnage of vessels flying the Japanese flag. In 1900 Japanese shipping was composed of 846 steamers of 528,321 tons and 3280 sailing vessels of 304,161 tons, making a total of 4,126 vessels and 832,482 tons in all.

## AUTOMATIC DOUBLE CAR TENONER.

Manufacturers of the tenoner shown in the illustration herewith say that to save labor was the first thought in bringing out this machine. "We have," they say, "a machine that is entirely automatic, taking from the operator all responsibility as to the marking of his stock." Attention is directed by the manufacturers to the following points claimed for the machine:

It cuts to exact lengths, and each pieces comes from it accurately



worked and with wonderful rapidity.

It will cut off and tenon material from 10 in. to 9 ft. long between shoulders, and will cut-off and tenon both ends of timber to 24 in. wide and 8 in. thick. By cutting off the lengths on some other machine, dispensing with the saws on this, timbers 12 in. thick can be tenoned to advantage. Saws 22 in. in diameter can be used, and operating in advance of the cutter heads the bur raised by the saws is perfectly removed by the cutters, thus saving much valuable time. A special head is provided for making double tenons to 4 in. deep. There are eight tenoning heads, two on each spindle, each carrying two knives cutting tenons 6 in. long, so by using two heads on each spindle a tenon 12 in. long can be cut. The machine is massive, built to stand hard work, and the adjustments are made quickly and accurately.

The makers, J. A. Fay & Egan Co., of Nos. 325 to No. 345 West Front street, Cincinnati, Ohio, will be glad to send to those interested prices, cuts of machine and full information, and will also send, charges prepaid, their large new combined 450-page catalogue, showing each and every machine they make.

## SHIP YARD NOTES.

Gibson Fahnestock's three-masted schooner yacht Shenandoah was successfully launched last Saturday from the builder's yard at Shooter's Island. This yacht was designed by Theodore E. Ferris and built by the Townsend & Downey Ship Building & Repair Co. She is a steel vessel and is intended for off-shore cruising. The Shenandoah is a handsome model and should be very easy in the sea. She has large displacement and will have a large carrying capacity. The dimensions of the yacht are 135 ft. over all, 100 ft. on the water line, 27 ft. beam and 14 ft. draught. The interior fittings will be very elaborate and the furnishings will be handsome. The decorations will be white enamel and gold and the joiner work of mahogany. A companionway aft will lead to a steerage, on the port side of which will be a chart room, and on the starboard side a stateroom for the sailing master. Forward of these rooms will be the owner's quarters which are 11 ft. by 25 ft. From these rooms a passageway will lead forward and on one side of this will be a bathroom and on the other a guests' stateroom. This passageway is reached by a companionway from the deck. Forward of the stateroom and bathroom will be two more guests' staterooms each 10 ft. by 12 ft. The main saloon will be forward of these rooms. It will be 15 ft. by 27 ft. and fitted with sofas, table, bookcase, organ, desk and fireplace. It will be ventilated and lighted by a skylight in the deck and by side ports. The decorations will be of wood pulp figures of the colonial order. Forward of the saloon will be the galley and then will come the quarters for the crew. The rig is to be a novel one. The yacht will have three masts and for off-shore cruising the foremasts will be square rigged, but the yards of these sails will be taken off and the ordinary fore-and-aft topsail used when cruising near the shore. The skylights, companions, hatches and rails are of teak. She will carry two lifeboats, two gigs, a cutter and a launch.

The new steel steam yacht Margaret, built for John H. Rutherford of the New York yacht club by the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, N. Y., was launched a few days ago. The Margaret is 120 ft. over all, 95 ft. on the water line, 16 ft. beam and 3 ft. 10 in. draught. She has twin-screw, triple-expansion engines and a Seabury water-tube boiler. She is a trunk-cabin type of yacht. The cabin and deckhouse are finished in teakwood outside and mahogany inside.

At Sammis & Dickinson's ship yard, Huntington, L. I., a new oyster boat was launched a few days ago for Stanley Lowndes of Northport, L. I. The boat is 67 ft. long and 16 ft. 9 in. beam. She is equipped with an 85 H.P. Globe gasoline engine.

Howard's Ship Yard, Jeffersonville, Ind., has contracted to build a new boat for the St. Louis & Tennessee River Packet line. She will be 150 ft. long and 28 ft. beam and will have an engine with cylinder of 14 in. diameter and 5 ft. stroke.

The new auxiliary yacht which the Harlan & Hollingsworth Co., Wilmington, Del., is building for H. W. Putnam, Jr., will be named Ariadne. Her dimensions are 140 ft. over all, 110 ft. on the water line, 28 ft. beam and 14 ft. draught.

Hay & Wright, Alameda Point, Cal., are building for the Standard Oil Co. what is said to be the largest wooden sailing vessel that has ever been constructed on the Pacific coast. She will carry oil from San Francisco to Honolulu.

## ENCOURAGING RUSSIAN SHIP BUILDING.

Further particulars are to hand from the St. Petersburg correspondent of the Mouvement Maritime on the subject of the measures about to be taken in Russia for the encouragement of ship building and ship owning in that country, which were briefly outlined in the last issue of the Review. The ship owner is to be provided with the greater part of the funds necessary for acquiring and working his ship; provided he conforms to certain regulations imposed by the state. As soon as the building of

the vessel is completed, a sum equal to half her cost is to be advanced to the owner, providing that she is built in Russia of Russia materials, and the advance will have to be repaid in twenty equal annual installments without interest. The advance, however, will only be made in the case of steamers built to the requirements of Lloyd's (British), and developing a speed of not less than 10 knots. The reason put forward by the Russian government for this protectionist measure is that the cost of building a vessel in Russia is 30 per cent. more than if built abroad—so that a cargo boat which could be built in England for 400,000 roubles would cost 520,000 roubles if built in Russia. The government, therefore, by advancing to the ship owner half of the building cost, not only makes up the difference between the price payable to an English ship builder and that payable in Russia, namely, 120,000 roubles, but at the same time places at his disposition a sum of 140,000 roubles which he can employ in the working of his vessel. It is, however, only an "advance" of money, after all, and although advanced gratuitously it will have to be repaid—the amount in the case just cited being 260,000 roubles.

In the end, therefore, the ship will have cost 520,000 roubles, whereas it could have been got from England for 400,000, and so, in order to equalize the position, the vessel is to be insured by the government for two-thirds of her value at a premium of 2 per cent., and this will mean a reduction of more than half the insurance premiums payable on a vessel built abroad. But the protection thus afforded to Russian ship owners is not to stop here. They are to be reimbursed half the cost of fuel consumed by steamers of a carrying capacity of not less than 200,000 poods, loading in a foreign and bound to a Russian port, or vice versa, and carrying a cargo of at least three-fourths of their capacity. It was not necessary, of course, to allow this bounty to ships in the Russian coasting trade, for the simple reason that this traffic is exclusively reserved to ships navigating under the Russian flag. If it be taken that the annual coal bill for a steamer represents on an average from 9 to 12 per cent. of the cost of the vessel this reimbursement by the government of half the amount spent in fuel will greatly assist the ship owner in repaying the money advanced to him. In order to secure the coal bounty, however, Russian coal will have to be used, and this, it is anticipated, will give a great impetus to the export of coal from the south of Russia to ports in the Baltic, and will, besides, induce ship owners to establish depots of Russian coal in foreign ports. The benefits of this proposed new system are only to be enjoyed by ship owners who are Russian subjects, firms the partners in which are Russian subjects and joint stock companies, the shares in which shall be nominally held by subjects of the empire. The Russian press warmly favors the adoption of the project with the least delay possible.

## BOILER REPORT CONSIDERED UNSATISFACTORY.

The Hampshire Telegraph, in discussing the boiler committee's report on the trials of the boilers of the British naval vessels Minerva and Hyacinth, says:

"The boiler committee's report, which has just been presented in the form of a blue book, is a disappointment. It opens up the whole question without giving any further information, while the conclusions arrived at are based on the Minerva and Hyacinth trials, which took place last summer. The committee consider that the Bellevilles are not the best type of water-tube boiler, but they do not say which is. In fact, they could not do so, seeing that they have had no opportunities for finding out, as the big ships in which new types are to be fitted will not be ready for another two years. Meanwhile it is significant that not only in the case of the steam trials of the cruisers Aboukir and Good Hope, but also in the Formidable and two or three other ships in commission, the experience with the Bellevilles has been that they worked splendidly, giving no trouble although requiring great care. The committee do not seem to have paid sufficient attention to this point, for there can be no ignoring the fact that the shortcomings of these boilers are largely due to the inexperience in the stokehold and the paucity of stokers. Nor does the question of workmanship appear to have been sufficiently considered, in view of the fact that while the boilers of some firms turn out well those supplied by others are almost a failure."

## OVER SEVENTY-EIGHT MILLIONS IN DIVIDENDS.

With each distribution of profits by the Calumet & Hecla Mining Co. attention is directed to the magnitude of its operations. This company was organized under the laws of Michigan in 1871 and rechartered in 1900 for thirty years. It has a capitalization of \$2,500,000 divided into 100,000 shares of \$25 par value each. It had 3,413 shareholders of record on Jan. 1, 1901. Its production of copper for the calendar year 1900 was 77,761,382 lbs. and for the year 1901 it was about 93,000,000 lbs., the largest in the company's history. The cash surplus of the company at the close of the fiscal year, April 30, 1901, was \$2,168,130. Up to the close of 1901 the company had paid dividends amounting to \$78,350,000. This is the largest amount paid by any mining company in the world. The mineral lands of the company comprise about 2,750 acres in North Range besides considerable tracts west of the Tamarack on the mineral belt. It also owns extensive timber lands in the upper peninsula of Michigan and in northern Wisconsin.

Two warships which the Chilean government has ordered from Barrow and Elswick are to measure 435 ft. in length with a breadth of 70 ft. Their engines are to develop 25,000 H.P. and their armament will comprise four 10-in. guns, fourteen 7.5-in. quick-firers and a number of smaller quick-firers.

## EVOLUTION OF AMERICAN WARSHIPS.

Philadelphia, April 16.—The tremendous strides in the comparatively few years in the construction of ships of war is well illustrated by the various types turned out since the last wooden ship of the line, the Pennsylvania, was destroyed by fire in Norfolk harbor in the early 60's. Had it not been for a Pennsylvanian the Maine class of battleship perhaps would never have been built, for it was Charles H. Cramp, the veteran head of the Cramp company, who not only declared it possible to produce a ship superior to all others, but submitted designs that proved it.

Originally it was intended by the navy department to build three battleships of 17 knots speed, carrying the heaviest armor and armament possible on 12,000 tons trial displacement, and having the usual Scotch type of boilers. The several bidders, under the requirements insisted on, could not guarantee the ship wanted at the price limit which congress had named. Then Mr. Cramp, who had not bid under the first specifications, offered a set of original drawings. He proposed a battleship that could steam 18 instead of 17 knots, used the new Krupp instead of Harveyized armor and replaced the Scotch boilers with those of the water-tube type,

## EVOLUTION OF THE AMERICAN BATTLESHIP.

Ship.	Length.	Breadth.	Draught.	Tonnage.	Speed.	Side Armor.	Gun Positions.	Main Battery.
Old Maine....	318.	57.	22.6	6,682	17.	12	12	4 10-in., 6 6-in.
Indiana.....	348.	69.3	27.1	10,288	15.5	18	17	4 13-in., 8 8-in., 4 6-in.
Iowa.....	360.	72.	27.	11,410	17.	14	15	4 12-in., 8 8-in., 6 4-in.
Alabama....	368.	72.3	25.	11,525	16.	16½	17	4 13-in., 14 6-in.
New Maine....	393.10	72.	23.6	12,300	18.	11	12	4 12-in., 16 6-in.

## EVOLUTION OF THE AMERICAN ARMORED CRUISER.

New York....	380.	64.	26.6	8,200	21.	4	10	6 8-in., 12 4-in.
Brooklyn....	400.6	64.8	26.	9,215	21.9	7½	8	8 8-in., 12 5-in.
Pennsylvania	502.	69.6	24.6	13,680	22.	6	6½	4 8-in., 14 6-in.

so successfully used in ships built for Russia. Further, he offered to build the ships inside of the \$3,000,000 limit, and after due consideration his plans were adopted as official and bids were called for. The award was to the Newport News company for the Missouri, the Union Iron Works for the Ohio and the honor of building the new Maine was delegated to the creator of that type.

As happily put by Charles H. Cramp "the Maine is an improved Alabama and an enlarged Retzian combined." Had the old Maine been so constructed below the water-line as is the new, the chances are that sinking would have been avoided when the crash came in Havana harbor. The new vessel has what is claimed to be the first perfect arrangement of water-tight compartments ever devised. Every one can be instantly closed from a central station located on the upper deck and the system is so perfect that failure is impossible. How the lesson of Santiago was appreciated is shown by the elimination of every bit of woodwork from the ship.

From Ericson's monitor to the Maine, a step of only forty years, America's advance has more than kept her with the world. The big naval programmes of England and France brought about the development of the floating fortress with armor belts sometimes 24 in. thick, as on the British Inflexible, and guns whose bore was 16 in. The futility of such things became apparent in a short while and by the time the United States began building battleships the Maine and Texas came along, drawing 22 ft. 6 in. of water on 6,682 tons displacement. Then the Indiana class was projected. They were for coast defense, the floating fortress idea carried out still further, for they had 18 in. of armor in the thickest place and drew 27 ft. of water on 10,288 tons. With the Alabama the idea of less draught on greater displacement was worked out, for she drew only 25 ft. on 11,525 tons and now comes the new Maine who can deposit her bulk of 12,300 tons in 23 ft. 6 in. of water.

The improvement, however, has not ended there, for the new owner of the Krupp process has more than double the resisting strength of the compound kind used when England thought 22 in. necessary, and when it is considered that the guns, powder and projectiles have improved in proportion, the significance of the armor comparison becomes apparent. Harveyized armor came in between the compound and the Krupp. It was a big improvement of the former, but is far behind the latter. Naval Constructor Hanscom, in enumerating many of the above points of evolution, calls attention also to the guns. The sixteen new 6-in. rapid-fire guns are deemed as powerful as a similar battery of the 8-in. kind on other battleships. In short, it is calculated by experts that the Maine, Ohio and Missouri will be fully the equal of any ships afloat of the same period of 1,000 tons greater displacement, and even more than a match for the great British Formidable class, despite their 15,000 tons.

What is true of the battleship is more than true of the cruisers, in particular the Pennsylvania, which followed the Maine on the stocks. Practically, this vessel is an enlarged but very much improved New York, and it was the latter vessel which excited the admiration of the entire naval world. Her 380 ft., however, seem small compared to the 502 of the Pennsylvania. Still she lies 26 ft. 6 in. deep in the water, while the Pennsylvania will get along with 24 ft. 6 in., although her displacement is 13,680 tons as against 8,200. Then again there is the speed and its value is well known. The New York contract called for 20 knots and she did 21. The Pennsylvania's calls for 22 and she is likely to do 23. This is a knot faster at least than any British or French armored cruiser and her battery of four 8-in. and fourteen 6-in. rapid-fire guns is the most powerful ever mounted on a cruiser.

The proposition to enlarge the Erie canal was under discussion at a meeting of the German River & Canal Society held in Berlin last week and it was held that the enlargement of the canal to permit ocean-going steamers to reach the great lakes would be without practical advantage. This is the view the Review has always taken of the ship canal. The cost of navigating an ocean-sized vessel through it would absorb all the profit in freight. But the barge canal is quite another proposition. It would doubtless be profitable to operate 1,000-ton barges through the canal.

## PROPOSED NEW STEEL COMBINATION.

According to an announcement made by Mr. F. H. Clarke of the firm of Blymyer, Hobbs & Clarke of New York, a new steel combination with a capital of \$200,000,000 is to be formed which will take in a large number of independent blast furnaces and steel mills in the east and middle west which were not included when the United States Steel Corporation was formed. Something was heard of this last winter but nothing came of it. Following is Mr. Clarke's statement:

"The original plan which those interested had in mind was the amalgamation of some forty mills and furnaces. This plan has been materially changed, primarily because while all the properties intended to be taken over are making very large profits at current prices, their location is of a disintegrated character so that the policy of concentration could not be successfully carried out. It is only with a view to the permanent future advantages that would be obtained that the best independent mills could, with justice to themselves, consider such a union. The litigation over the title to the Aetna furnaces at Ironton and the Hartman Co. complications at Newcastle were of minor consequence. The Hartman plant would not have been included but the Cuyahoga mills were considered desirable except for complications existing between them and the Union Trust Co., receivers of the Hartman Co. at Pittsburgh, and the City and Hanover banks in New York. The Troy steel plant is superior as a plant to the general belief. It is in my opinion certain that other of the independent mills and furnaces will unite, but now Mr. Frank Conger is dead I regard it as improbable that any of the bridge companies which he represented and which it was proposed to include will now unite."

Mr. Clarke gave out this list of the companies which he said would be included in the new trust:

Blast Furnaces—Girard Iron Co., Mattie furnace, estate of A. Byers; Andrews & Hitchcock (two), Hubbard furnace, Hubbard, O.; Ohio Iron & Steel Co., Mary furnace, Lowellville, O.; Brier Hill Iron Co., Brier Hill furnace, Youngstown, O.; Cherry Valley Iron Co., Cherry Valley furnace, Leetonia, O.; Cherry Valley furnace, Middlesex, O.; Youngstown Steel Co., Tod furnace, Youngstown, O.; Punxsutawney Iron Co., Punxy furnace, Punxsutawney; Dunbar Furnace Co., Dunbar furnace, Dunbar, Pa.; Stewart Iron Co., Ltd., Stewart furnace, Sharon, Pa.; Belfont Furnace Co., Belfont, O.

Mills—Kelly Nail & Wire Co., Ironton, O.; Norton Iron Works Co., Ironton, O.; Belfont Iron Co., Ironton, O.; Marting Coal & Iron Co., Ironton, O.; Ashland Steel Co., Ashland, Ky.; Cuyahoga Wire Co., Akron, O.; Summit Wire Co., Akron, O.; Le Belle Iron Works, Steubenville, O.; Phoenix Iron Works, Phoenixville, Pa.; Troy Steel Co., Troy, N. Y.; Riter & Conley, Pittsburgh; Carbon Steel Co., Pittsburgh; Youngstown Iron Sheet & Tube Co., Youngstown, O.; Howe & Polk (tubing), Danville, Pa.; Central Iron Works, Harrisburg, Pa.; Waukesha Sheet Steel Co., Waukesha, Wis.; Boston Bridge Works, Boston, Mass.; King Bridge Co., Cleveland, O.; Phoenix Bridge Co., Philadelphia; National Bridge Co., Canton, O., and Groton.

Other concerns—Bessemer Coke Co., Pittsburgh, Pa.; Brotherton and Sunday Lake Mines, Michigan; Biwabik Ore Co., part interest, Mesabi; Mahoning Ore Co., part interest, Mesabi; Union Limestone Co., part interest, Ohio.

The organizers, Mr. Clarke said, were principally Joshua Rhodes & Co. of Pittsburgh, E. N. Ohl of Newcastle, Pa.; E. J. Baird of Ironton, O., and J. Gifford Ladd of New York, representing the Youngstown concerns, behind whom was Mr. Frick. The \$200,000,000 of stock would be divided, he said, equally into preferred and common stock. Last year the earnings of the companies, Mr. Clarke said, were \$12,500,000, the blast furnaces alone producing 50 per cent. of the iron ore used in the Bessemer steel plants of the country. Mr. Clarke said that no name for the new concern had been decided on as yet and it was too early to give out a list of officers.

The King Bridge Co. of Cleveland, which is included in the combination in Mr. Clarke's statement, denies that it is to be part of the proposed plan.

## NO SUBMARINES THIS YEAR.

The fact that the house naval committee has voted not to incorporate any provision for submarine boats in this year's naval appropriation bill is evidence that there is a division of opinion as to the value of these craft. Representative Cummings of New York, however, has introduced a bill requiring the secretary of the navy to contract for thirty Holland submarine boats, at a cost not exceeding those now under construction and after one of the new boats now being built is accepted by the secretary of the navy. There is still a considerable element in the navy department which wants these boats to prove their case before others are built. While they have been successfully submerged their value as offensive engines of war is yet to be demonstrated.

The board that has been considering for the secretary of the navy the actual cost to the builders of the torpedo boats and torpedo-boat destroyers recently completed, has made its report to the department. It is probable that Secretary Long will transmit it to congress with some recommendation for the relief of the ship builders. The builders have lost heavily on their contracts. The government has already reduced the conditions necessary for the acceptance of the boats and it is probable that some financial restitution will be made. At the suggestion of the ship builders Secretary Long appointed a board to examine their books so that the department is apprised as to the actual extent of the loss.

The German emperor has conferred upon Rear-admiral Sir Edward H. Seymour, formerly naval commander of the first British expeditionary force in China, the order of the Red Eagle with sword of the first class, and upon Capt. Jellicoe of the British navy the same order of the second class. What prompted the kaiser thus to honor the British officers was Capt. von Usedom's report on the operations for the relief of the Pekin legations.

The cruiser Chicago has gone into dry dock at Messini, Italy.

## SCOTLAND AND THE ADMIRALTY CONTRACTS.

Glasgow, April 5.—The event of the day in the ship building world has been the placing this week of the British naval contracts, and, as was confidently expected, the bulk of contracts has been allotted to the Clyde. The orders given out are for two battleships, five first-class armored cruisers, two third-class cruisers and ten torpedo boat destroyers. One of the battleships is placed with the Fairfield Ship Building & Engineering Co., Glasgow, and the other with the Vickers-Beardmore combine, but to be built at the Barrow yard, where was recently built the gigantic Mikasa for the Japanese navy. Four of the first-class cruisers are to be built on the Clyde, namely, one by William Beardmore & Co., one by John Brown & Co. of Clydebank, one by Scott & Co. of Greenock, and one by the London & Glasgow Ship Building & Engineering Co., Glasgow. The fifth is to be built by the Armstrong-Whitworth Co., Elswick-on-Tyne. One of the third-class cruisers is also to be built by the Armstrong-Whitworth Co. and is to be fitted with Parsons steam turbines and also with a set of triple-expansion reciprocating engines for driving two of the propeller shafts at low speed when needed. The other third-class cruiser is to be built by Laird Bros. at Birkenhead on the Mersey. It will be seen that Scotch builders have come off uncommonly well in the competition. They do not, however, get any of the destroyers to build, never having made a specialty of that class, though the Fairfield company and the Clydebank company have built several of them. The destroyer contracts are allotted—three to Laird of Birkenhead, three to Yarrow of London, two to Palmers company of Yarrow-on-Tyne, and two to Hawthorne, Leslie & Co. of Newcastle-on-Tyne. Of the two last named, one is to be fitted with Parsons steam turbine machinery. The only contract allotted to London builders, besides the three destroyers to Yarrow & Co., is one to the Thames Iron Works Co. for the engines of the battleship King Edward VII, which is being built at Devonport dock yard.

The Fairfield company has built many big warships before but never a battleship of this type. Indeed the three new battleships (building respectively at Glasgow, Barrow and Devonport) will be the largest and heaviest vessels of war ever yet built, exceeding in dimensions even the big Japanese battleships, at present the largest afloat. The new British battleships will be of 16,350 tons displacement (which, by the way, is a good deal short of the 28,500 tons displacement of the Oceanic when leaving port), and 1,000 tons ahead of previous warship records. Japan's biggest is 15,200 tons; France's, 14,860 tons; Russia's, 13,000 tons; Germany's, 13,000 tons; Italy's, 12,000 tons, and Austria's 10,000 tons. The new American battleships will, I believe, be about equal in weight to ours. The Fairfield vessel will be 425 ft. in length, 78 ft. beam, and 26 ft. 9 in. draught at 16,350 tons displacement. The armor will be 23 ft. in depth, extending to the upper deck, and the armament heavier than that of any vessel as yet designed by any European nation. The machinery will be of the four-cylinder, triple-expansion type, indicating 18,000 H.P. and developing a speed of 18½ knots. The boilers will be of the Babcock & Wilcox water-tube type for two-fifths of the power, and of the cylindrical type for the remaining three-fifths. This arrangement will make the machinery 150 tons heavier than in the two sister battleships simultaneously building, which will be fitted with the Babcock & Wilcox boilers only.

The cruisers to be built by Beardmore, Brown, Scott and the London & Glasgow Co. will be alike, 450 ft. in length and 67 ft. in beam (which is 10 ft. and 1 ft. respectively more than the former members of the County class). They will be of 10,200 tons displacement (an increase from 9,800 tons) and will have a speed of 23 knots.

These new orders will make nine first-class 23-knot cruisers and one battleship in various stages of construction in Clyde ship yards this year. The battleship will cost about a million sterling and the cruisers about £700,000 each, so that a large amount of government money will be circulating here for some time to come. The armor forms the subject of separate contracts. Four of the ship builders are also makers of armor plates, namely, William Beardmore & Co., Vickers Co., John Brown & Co., and the Armstrong-Whitworth Co.

It must be confessed that the placing of so many of the admiralty orders in the Clyde is greatly welcomed in industrial circles here. It means a large employment of men and a continuous demand upon a variety of industries; and it comes at a time when ship building prospects are not very brilliant. Thus last month (March) Scotch ship builders put into the water twenty-one new vessels aggregating 36,000 tons, but they did not book of new orders more than 16,000 tons of merchant vessels. None of these orders was very important. They included two steamers of 3,500 tons each for the China Steam Navigation Co., to be built at Greenock; a 2,000-ton cargo boat for Norway, to be built by the Campbeltown Ship Building Co.; a 2,000-ton cargo and passenger boat for the Leith & Continental trade, to be built on the east coast, and some miscellaneous craft. The tonnage launched during the month included a twin-screw of 6,000 tons (the Mexico), built by Caird & Co., and a twin-screw of 5,300 tons (the Panama), built by the Fairfield company, both for the Pacific Steam Navigation Co.; a twin-screw of 5,000 tons for the Union-Castle Mail (South-African) line, built by Barclay, Curle & Co.; a steamer of 4,400 tons for private owner, built by Robert Duncan & Co.; a cargo boat of 2,500 tons, built by the Greenock Dockyard Co.; a boat of 1,400 tons for the Great Eastern Railway Co., built by Gourley Bros., Dundee; a 3,000-ton sailer for the Anglo-American Oil Co., built by A. Rodger & Co., and a number of smaller vessels, dredges, steam fishing vessels, tugs and barges.

The March output (36,000 tons) compares with 36,700 tons in 1901, with 39,000 tons in 1900, with 57,135 tons in 1899 and with 20,170 tons in 1895. It brings up the total output for the first quarter of the ship building year to 106,000 tons, which compares unfavorably with 112,300 tons in the first quarter of 1901, and with 118,000 tons in the first quarter of 1899, but exceeds all other records.

The order books in the ship yards are getting cleared off and after midsummer there will not be a great deal doing, aside from the naval contracts, unless some more contracts for merchant vessels are placed this and next month. There is usually very little contracting done during the summer. Were it not for depressed condition of the freight markets ship owners would find inducement enough in the lowered costs to replenish their fleets. For instance, a 6,000-ton boat was recently ordered at £2 per ton less than would have been accepted a year ago. For a big transatlantic cargo liner tenders have been submitted 25 per cent. under

what would have been asked eighteen months ago. At present good-class cargo boats can be built at somewhere about £6 per ton deadweight capacity, which is certainly not a long price. Meanwhile the ship yards are paying off a few men from time to time as the work decreases, but are (except in the north of England) as yet, making no attempt to reduce wages. Scotch ship builders are by no means desirous of breaking down wages. They would much rather keep up a good scale of pay if the men would only work up to it and give up "slinging the hatchet" and "boozing" after pay-day. The industry has been enlivened by the admiralty contracts and by the knowledge that some half dozen of the big lines will have to place orders for new tonnage before the year is much older. The mail lines especially are bound to keep their fleets up to date.

While the shipping world is waiting with interest the fate of the subsidy bill in the United States house of representatives—though with some surprise that Americans should still cherish the delusion that any such measure is necessary to the regeneration of their mercantile marine—the shipping bounties bill has passed through the French chambers and has become law in France. It will not be without some benefit to British and especially to Scotch ship builders, for it provides for bounty to be paid on the first 200,000 tons of new steamers built abroad, as well as for the first 300,000 tons built in France for French owners. The foreign-built ships will get only one-fourth to one-third of the bounties payable to French-built ship, but then we can build so much cheaper than France can that we will get all the building they can give. The new bounties for foreign-built vessels are on a lower scale than those hitherto payable. The navigation bounty on French steamers has been slightly increased, that on sailors slightly reduced on vessels over 1,000 tons, the object being to encourage steamers and rather discourage sailors, of which France has had more than any other nation, simply because they were the best bounty-earners on the navigation subsidies.

The battleships Mars and Hannibal are being fitted at Portsmouth dock yard with oil fuel furnaces for their single-ended cylindrical boilers, of which each vessel has eight. The oil is to be used in its crude state in combination with coal. It was by this process that the best results were obtained recently in the series of trials on the destroyer Surly. Oil requires more air for complete combustion than coal and this is the difficulty with the ordinary marine boiler, so as to avoid the generation of dense smoke. For high power the trials on the Surly were not a success, because the amount of oil burned per square foot of grate was about one-half that of the coal consumed. But in battleships, where the consumption is less than one-third of that of destroyers, the amount of oil to be consumed per cubic foot of furnace will be relatively small.

In about a week hence the gunboat Medura will begin trials with the Durr water-tube boilers with which she has been fitted. The event is noteworthy because she is the first of our vessels to be fitted with this steam generator, which I have described in former letters. This boiler is not much known as yet outside of Germany, though it is fitted on several of the vessels of the German navy. The gunboat Medea (sister ship of the Medura) is being fitted with large-tube Yarrow boilers for competitive trials. Both experiments are being conducted under the supervision of the special committee on boilers appointed by the government.

## THE GASOLINE DORY.

The dory has always been a popular form of small craft, owing to its admirable sea qualities. Now the dory is being equipped with a gasoline engine and is becoming more popular than ever on the Atlantic coast. The 1902 dory, fitted with gasoline engine and propeller, will range in length from 17 to 35 ft. over all, and be from 13 to 25 ft. long on bottom. These boats will have a range of beam from 4 ft. 8 in. to 8 ft., and will be from 16 in. to 30 in. wide at the widest part on bottom. The sheer of the smallest size dory will be 8 in., and that of larger sizes in proportion. The boats will be from 20 in. to 30 in. deep, plumb, amidships. The bottom, stem, stern and gunwales of these boats will be of oak, the timbers of hackmatack or oak, and the planking of pine or cedar. There will be from four to eight strakes on a side according to beam and width of bottom. The fastenings are galvanized throughout. The designs of these boats give them the "spoon" or knockabout bow with great overhang, or regular lobster dory bow, with overhang of from 2 ft. to 2½ ft. as may be desired. Interior arrangement of seats, lockers, etc., are of course largely a matter of the owner's fancy, dependent upon the use to which he means to put his boat. But most of the power dories now under construction have the engine aft with cock-pit running well toward the bow, seats and lockers around the sides, and wheel in the bow. A few of the smaller sizes are being built open. But the majority are decked fore-and-aft and on sides, and are furnished with wash boards to prevent water from coming into the cock-pit when running in a heavy sea. Some of these boats are fitted with center boards; others, without.

The gasoline engines used in these boats will be from 1½ H.P. for the small size dories up to 7 H.P. for the larger size. The gasoline tanks, which will be placed well in the bow and decked over, have a capacity from ten to twenty-five gallons, according to the size of the boat. The consumption of gasoline is one pint per horse power per hour, a fact which will readily appeal to experienced yachtsmen, and all who may wish to use their boats on extended cruises. By actual test it has been shown that these power dories have a speed of from 7 to 10 miles per hour, according to conditions of weather, sea, etc. Everyone who has had practical experience with clipper dories knows their qualifications as sea boats. In fact, when properly handled, there are no safer craft of their size in existence. They do not smash through the seas like a straight stem boat, but meet the waves promptly, ride them buoyantly and are about the "driest" boat known. Being flat-bottomed they are available for shoal places, and are easily landed on the beach. They can be put to sea through a surf which will swamp the regulation lifeboat, and as they have greatly bevelled sides and are sharp both fore and aft they displace very little water, and are easily propelled. Then, too, they will stand more hard knocks than any boat afloat, and are especially adapted to rough usage in salt water.

The principal objection to the dory is her propensity to make leeway under certain conditions. Being flat bottomed, she has less hold on the water than a keel boat, and even with the center-board down, when propelled by either sail or oars, is bound to make more leeway than a keel boat, a fact which cannot be denied. But the new power dory propelled by gasoline engine and screw will make less leeway than if propelled by sail or oars.

## FRENCH NAVAL ESTIMATES.

The French naval estimates are usually discussed so thoroughly in the chamber of deputies that they pass through the senate with very little debate. The estimates for 1902, however, having been adopted with practically no discussion in the lower house, the senate has made up for the deficiency by devoting a good deal of time to the naval program. The occasion has been seized by Admiral de Cuverville to explain the program which is being carried out despite the opposition of certain people, "entirely ignorant of the naval profession," who are anxious to convert the navy into a fleet of commerce destroyers. Apparently this has reference in part to M. Lockroy, under whose administration Admiral de Cuverville was obliged to resign his position as chief of the Etat-Major because he could not agree with the decision of the minister to separate the vessels under construction from those afloat. The admiral differed from the minister not only on this minor point, but also on the entire program of M. Lockroy so far as it aimed at sacrificing powerful units to a fleet of small and fast vessels. He regards the commerce destroyer pure and simple as an illusion, and points out that it has never succeeded in France unless the cruisers are supported by squadrons which keep the enemy engaged while the commerce destroyers attack the mercantile marine. The commerce destroyer has, in fact, a limited and special task, and the only vessels capable of waging war are the battleships. He argues that if the number of vessels forming a navy is a factor of success, their quality is another and still more important factor, and it is better to concentrate forces in a few powerful vessels than to have a number of weak ships. It is difficult, says Admiral de Cuverville, to design battleships which shall combine all the advantages that should be possessed by such vessels, but he is of opinion that the type being constructed under the existing program represents the best that can be obtained, since the new ships have been given the maximum of offence and defence and a range of action which permits of their going from Brest to the Antilles and back at a speed of 18 knots without taking in fresh supplies of coal. As for the armored cruisers he thinks that the speed of 21 knots is amply sufficient, for it would be a grave mistake to sacrifice the power of the vessel to increase its rate of steaming, and though speed is a quality it is a very precarious one. If the slightest accident happens to the engines, or the coal is of too poor a quality to get the necessary steam pressure for full speed on a long run, the cruiser will be entirely at the mercy of the battleship. Nevertheless, the armored cruisers are capable of rendering very important services, especially for the protection of the colonies and in serving as a base for the Transatlantic steamers, which, on being armed, would be particularly adapted for carrying on the work of commerce destruction.

Turning to the submarines and submersible boats, Admiral de Cuverville points out that they fulfill entirely different conditions, the submarine, propelled exclusively by electrical power, being suitable only for coast defence, while the submersibles, with an oil engine for traveling at the surface and an electric motor for moving under water, possess a much wider range of action. The government has been reproached with not putting a larger number of submarines on the stocks, but Admiral de Cuverville fully approves of the official reserve, since he argues that while the electric submarine has proved itself very efficient for coast defence, the storage batteries offer a good many inconveniences, and in the present development of electrical science it is wise to proceed cautiously. Nevertheless, the admiral is of the opinion that the submarine is a very useful auxiliary, as was proved during the maneuvers at Ajaccio last year. With the quick-firing guns now employed it is impossible for a torpedo boat to get within striking distance of a battleship or a cruiser in the daytime, but the submarine is able to approach without being observed, though we may recall that at Ajaccio the submarine itself was, theoretically, blown out of the water when it had launched the torpedo. The admiral recommends that a couple of submarines be sent to Diego-Suarez to complete the defence of that "Key of Madagascar," for during the events of 1898, when England and France were on the point of coming to blows, the French government was well aware that a British fleet was standing off Diego-Suarez ready for attack, and if the port—at that time practically undefended—fell into the hands of the British they would have had entire command of Madagascar. Summing up his criticisms, Admiral de Cuverville urges that it is necessary to make a new classification of the fleet, and separate the vessels which entirely fulfill the conditions of attack and defence from those that do not possess the same fighting value, these latter being relegated to the second line. If this were done, France would find her first line considerably diminished. The superior council of the marine has estimated that the country needs twenty-four first-line-of-battleships. The admiral has a poor opinion of the swift cruisers as constructed in France. He says that they are only suitable for fleeing before the enemy, and he argues that France does not require this type of vessel. Her genius is one of attack and not of defence.

The minister of marine, whose sympathies are entirely with the advocates of a homogeneous and powerful fleet, claims that he has been closely following the lines laid down by Admiral de Cuverville, as is proved by the fact that all the six battleships being constructed under the existing program are of identically the same type. At the time he became minister there were six submarines or submersibles either afloat or on the stocks and since then thirty-one have been put under construction while during 1902 thirteen others are to be started. Another question which is occupying his attention is the difficulty of getting a sufficient number of officers for the vessels being put into service. He hopes to do something towards solving this problem by placing the torpedo boats in charge of officers of an inferior grade instead of in the command of lieutenants as formerly.

## FALLS HOLLOW STAYBOLTS.

The Falls Hollow Staybolt Co. of Cuyahoga Falls, O., report a very large increase of late in the sale of their hollow staybolts (they make solid staybolts also) to manufacturers of marine and locomotive boilers. They say that most of their customers leave the hole in the staybolt open next to the fire as well as at the outer end, claiming there is just enough air admitted through the small holes in all of the bolts (the hole is usually of  $3/16$  in. diameter) to greatly aid the combustion of fuel. On this score they direct attention to two letters, one from Prof. Shepherd of Chicago University and the other from Mr. George Stevens, the latter written

when Mr. Stevens was superintendent of motive power for the Lake Shore Railway Co. Prof. Shepherd advocates the use of hollow staybolts in locomotive boilers as a means of aiding the combustion of fuel. He says:

"With a proper drafted locomotive in which bituminous coal is the fuel used a proper distribution of hollow staybolts will undoubtedly be economic on fuel and also lessen the black smoke. The reason for this is evident because such a scheme insures better mixing of the oxygen from the air with some of the volatile fuel that would otherwise partially or wholly escape combustion."

Mr. Stevens says: "It has been our practice for several years to use your bolts for the stayng of locomotive fire boxes. This iron has given the best of satisfaction, and I have no hesitancy in recommending our practice, believing that the advantage of the hollow bolt for the purpose of detecting breakages is much more preferable than the solid bolt drilled for a short distance to accomplish the same purpose, as the drilled portion will become coated over with grease and other accumulations and fail to give the desired notice when breakage takes place. This hollow bolt permits of an opening both inside and outside of the fire box, thereby presenting a double opportunity for detecting breakages, as the annular opening passes through the bolt entire, and failure of the bolt at any place will immediately make itself known."

In further reference to advantages of the hollow bolt the manufacturers say: "The hole is always in the center of the bar and is of any size desired by the customer. For railway and marine trade  $1/8$  or  $3/16$  in. interior diameter is usually specified. The bars are always ready to cut, thread and apply. The double advantage for detection of breakage should it occur is of special value. The strength is always uniform throughout the entire length of the bolt, no one point being weaker than another, while on the other hand by the process of drilling tell-tale holes the bolt is weakened at its vital point, which causes it to break much sooner than it otherwise would. Again, the holes are not always drilled in the center of the bolt, but sometimes are drilled at an angle. Then the hole perforates the outside of the bolt, which causes it to leak at once, and the bolt has to be removed and at a very great expense. There is no such trouble with hollow staybolts. They will save thousands of dollars in inspection charges alone, as they are self-inspectors. No matter at what point the bolt breaks, fracture will be immediately indicated and explosion with consequent loss averted."

A test of staybolt iron made by this company—double-refined charcoal kind—shows it exceeds the requirements of specifications from most railway companies. The test was made at the McGill University, Montreal, and the particulars are: Length of sample,  $25\frac{3}{4}$  in.; mean diameter (outside), 1.014 in.; yield point, 32,000 lbs. per square inch; ultimate tensile strength, 49,300 lbs. per square inch; equivalent elongation in 8 in.,  $33\frac{1}{16}$  per cent.; reduction of area, 45.7 per cent. The Falls company also manufactures solid staybolts of the same high-grade double-refined charcoal iron. They warrant every bar to meet railway or government requirements.

## STEAMER WM. F. FITCH.

One of the best-known ship masters on the great lakes is Capt. Wm. Cumming, who is to sail the steamer Wm. F. Fitch, a freighter of about 5,000 tons capacity, launched a few days ago at the Wyandotte works of

the Detroit Ship Building Co. and christened by Miss Adeline Hurlbut. Capt. Cumming is especially proud of this new steamer, as it takes him back to the employ of the Messrs. Hanna of Cleveland, whose ships he has sailed for a great many years and with whom he has been a favorite.

When mining interests with which M. A. Hanna & Co. were closely allied were sold to the United States Steel Corporation the ships went with the mines, and Capt. Cumming was last year in command of one of the corporation vessels. The Messrs. Hanna are again acquiring new vessel property and building up a vessel organization under the direction of Mr. D. R. Hanna. The Fitch is one of the new fleet.

She is 366 ft. over all, 346 ft. keel, 48 ft. beam and 28 ft. deep. She will be equipped with triple-expansion engines, having cylinders of 22, 35 and 58 in. diameter, and a stroke of 42 in. Steam will be supplied by two Scotch boilers 13 ft. 2 in. diameter and 11 ft. 6 in. long.

Rogers, Brown & Co., well-known to the iron trade of the country, have purchased property on the main river in Cleveland, on which there will be erected at once a blast furnace of 400 tons daily capacity. A corporation known as the Cleveland Furnace Co., capitalized at \$1,000,000, will own and operate the furnace. Rogers, Brown & Co. are the principal stockholders. Plans contemplate the erection of two furnaces, but only one will be built now. It will be built specially for foundry and malleable iron. Mr. D. B. Meacham of Rogers, Brown & Co. is president of the new company. Members of the board of directors other than Mr. Meacham are Archer Brown, Wm. G. Park, J. G. Battelle and S. W. Croxton. David T. Croxton of Canal Dover, O., will superintend the construction of the furnace and will be manager for the company.

The Buffalo Forge Co. of Buffalo, N. Y., inventors and manufacturers of the well-known Buffalo forges, is engaged in distributing a new catalogue. It is a handy little book, envelope size, illustrated with half-tone engravings throughout. It describes in detail the many different types and sizes of forges—portable, blacksmiths, machinists, boilermakers, toolmakers, riveting, jeweler's forge, bench forge for light work, railroaders and prospectors, bellows, foot power, brazing and melting forges, folding forges for marine service, etc. The catalogue includes also descriptions of Buffalo hand blowers, power and hand drills, punches, shears, bar cutters, tire benders and tire upsetters. The little book is a handsome effort and well worth securing.

Resolutions favoring ship subsidy legislation and the immediate construction of the Isthmian canal were unanimously adopted on Wednesday by the American Association of Manufacturers in annual session at Indianapolis.



## SHIP BUILDING AT PHILADELPHIA.

Philadelphia, April 16.—The Imperial Russian battleship Retvian is soon to leave for Kronstadt. The officers are beginning to make their adieus and last Friday night the first of a series of festivities was held on board when a dinner was given in honor of the Russian embassy and the builders of the ship. Two other social affairs arranged by the officers are to follow and then the Retvian will proceed to Russia. The guests at the dinner included the Russian ambassador, Count Cassini; Countess Cassini, Baron Ferzi, the naval attache, and several other members of the Russian legation. The French naval attache, Capt. Vignal, was also among the guests. Others present were Rear-Admiral Wadleigh, commandant of League Island navy yard; Pres. Charles H. Cramp of the Cramp company; Mr. and Mrs. Edwin S. Cramp, Mr. and Mrs. Courtland D. Cramp, W. A. Dobson and C. T. Taylor. During the evening the commander of the Retvian, Capt. Eduoard N. Stchensnovitch, presented to Charles H. Cramp, on behalf of the officers, a drinking set of cloisonne, comprising six cups, a ladle and a large bowl resting on a plateau of silver. During the evening various complimentary toasts were proposed to the Cramp company and Capt. Stchensnovitch paid a fitting tribute to the great Kensington ship yard which made possible the magnificent craft of which he is in command.

It is believed in local ship building circles that the rumored new ship yard for Cooper's Point, Camden, opposite this city, will not materialize further than an expansion of the present Mathis ship yard. It cannot be even definitely confirmed that capitalists were making overtures for a site in that locality as reported. The general sentiment is that a new yard would scarcely prove a paying venture in view of the congestion of so many like interests in these waters. Already Camden has the large plant of the New York Ship Building Co., which concern is prepared to contract for a vessel of any size; the well equipped plant of John Dialogue & Sons; Mathis yard, builders of small craft; that of John Mills, which does a large repair business both to sail and steam craft, and Peter Hagan's yard, near Cramer Hill, wherein have been built many sea-going barges and other craft. There was an apparently well grounded rumor several weeks ago that the smaller yards would pool their interests, but there has been no development of the scheme.

The ship yards on the Philadelphia side of the river, the Cramps and the Neafie & Levy companies, both report a better business this spring than ever before in their respective histories. In particular this applies to the latter concern, which from comparative obscurity three or four years ago, has risen rapidly to a position where it can enter into aggressive competition for large government contracts. The cruiser St. Louis, on which work has been started, affords a vivid illustration of the ambitious policy of this company. This vessel will be the largest ever constructed in the Neafie & Levy ship yard, but instead of displaying any uneasiness over the size of the contract, Pres. Seddenger announces that a record will be made for fast time in this construction. Their principal work at present is the completion of the troublesome trio of torpedo boats, Bainbridge, Barry and Chauncey, and in hurrying the cruiser Denver.

The steam yacht Celt, building for J. Rogers Maxwell of New York, was launched from the yard of the Pusey & Jones Co. at Wilmington, last Saturday afternoon at 3 o'clock. Miss Elizabeth Hunter Pusey, daughter of W. W. Pusey, of the building firm, was sponsor. At the exact moment when the Celt plunged from the ways the steel ferryboat Red Bank, under construction for the Pennsylvania Railroad, was also launched.

The ferryboat Edgewater, built for the New York Central & Hudson River Railroad by the Harlan & Hollingsworth Co., Wilmington, has just completed a most successful trial trip, during which she made a speed of 14 knots an hour. The boat will be placed in service between New York and Edgewater.

During the past week no less than nine vessels, each taking over 1,000,000 gallons of oil, have sailed from Philadelphia for foreign ports. In January 102,130,621 gallons were exported, an increase of 84,415,753 gallons over the exportation during the same month last year. At present there are ten steamers, four sailing vessels and twelve schooners loading oil at the Point Breeze works.

## PRODUCTION OF OPEN-HEARTH STEEL IN THE UNITED STATES IN 1901.

(From the Bulletin of the American Iron & Steel Association.)

The total production of open-hearth steel in the United States in 1901, including direct steel castings, was 4,656,309 gross tons, against 3,398,135 tons in 1900, an increase of 1,258,174 tons, or over 37 per cent. The production of open-hearth steel has more than doubled in the last four years, having increased from 2,230,292 tons in 1898 to the figures above given for 1901. The following table gives the production of open-hearth steel ingots and castings, by states, since 1898:

States.	1898.	1899.	1900.	1901.
	Gross tons.	Gross tons.	Gross tons.	Gross tons.
New England .....	47,381	57,124	74,522	170,876
New York and N. Jersey .....	47,957	61,461	67,361	82,985
Pennsylvania .....	1,817,521	2,393,811	2,699,502	3,594,763
Ohio .....	79,886	117,458	130,191	184,943
Illinois .....	183,103	246,183	285,551	398,522
Other states .....	54,444	71,279	141,008	224,220
Total .....	2,230,292	2,947,316	3,398,135	4,656,309

In 1900 our open-hearth steel production for the first time exceeded that of Great Britain, which then amounted to 3,156,050 tons. Great Britain's production in 1900 was the largest in her history. Our open-hearth steel made in 1901 was produced by ninety works in fourteen states, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Tennessee, Alabama, Ohio, Indiana, Illinois, Wisconsin and Missouri. In 1900 ninety-four works and seventeen states made open-hearth steel. Neither Maryland, Kentucky, Michigan nor Minnesota produced open-hearth steel in 1901, although all four states were producers in 1900. Rhode Island made open-hearth steel for the first time in 1901.

In 1900 the production of open-hearth steel by the basic process amounted to 2,545,091 tons and by the acid process to 853,044 tons. In 1901 3,618,993 tons were made by the basic process and 1,037,316 tons were made by the acid process, as follows:

States—Gross tons.	Basic open-hearth steel.	Acid open-hearth steel.	Total Gross tons.
New England .....	87,529	83,347	170,876
New York and New Jersey .....	46,805	36,180	82,985
Pennsylvania .....	2,840,230	754,533	3,594,763
Ohio .....	120,146	64,797	184,943
Illinois .....	353,395	45,127	398,522
Other states .....	170,888	53,332	224,220
Total .....	3,618,993	1,037,316	4,656,309

The total production of open-hearth steel castings in 1901, included above, amounted to 301,622 gross tons, of which 94,941 tons were made by the basic process and 206,681 tons were made by the acid process. In 1900 the production of open-hearth steel castings amounted to 177,491 tons, of which 42,644 tons were made by the basic process and 134,847 tons by the acid process. The following table gives the production of open-hearth steel castings by the acid and basic process in 1901, by states:

States—Gross tons.	Acid castings.	Basic castings.	Total Gross tons.
New England, New York and New Jersey .....	33,165	3,989	37,154
Pennsylvania .....	104,631	3,855	108,486
Ohio, Indiana, Illinois and other states .....	68,885	87,097	155,982
Total .....	206,681	94,941	301,622

COMPAGNIE GÉNÉRALE TRANSATLANTIQUE  
FRENCH LINE—UNITED STATES AND EUROPEAN MAIL ROUTE.

New York to Havre-Paris in less than one week.

Steamers sail from New York every Thursday, at 10 a.m.

Company's own vestibuled train from Havre to Paris in four hours.

## FLEET 70 STEAMERS.

In New York service the following gigantic Twin Screw Steamers:

"LA LORRAINE" (new)	Twin Screw	15,000 tons	22,000 H.P.
"LA SAVOIE" (new)	"	15,000 "	22,000 "
"LA TOURAINE" (modern)	"	10,000 "	12,000 "
"L'AQUITAINE" (modern)	"	10,000 "	16,000 "

Naval officers command above steamers, insuring the same strict discipline as on a man-of-war. These ships all have double bottoms and water-tight compartments, and prescribed routes are taken to avoid fogs. The above steamers contain every modern twentieth century equipment for safety, most luxurious accommodations, and the cuisine is famous. The favorite route of the elite of both continents. For rates, plans and other particulars apply to

EUGENE DE BOCANDE, General Agent for United States and Canada, 32 Broadway, New York.

MAURICE W. KOZMINSKI, General Western Agent, 71 Dearborn St., CHICAGO,  
OR TO LOCAL AGENTS.

SMOOTH-ON  
IRON CEMENT

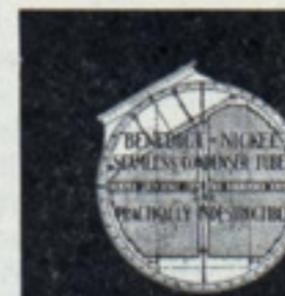
## IS A POWDERED-METALLIC-COMPOSITION

which, upon being mixed with water, becomes a hard metallic IRON, that is insoluble in water, steam or oil, withstands fire and expansion and contraction—being the same as iron is why it is sometimes called MAGIC IRON.

When applied to a blemish in a casting the blemish is removed. Hundreds of breaks or fractures in hydraulic machinery, leaks in connections in steam or water work, have been permanently and cheaply repaired with SMOOTH-ON.

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AND WRECKING CO., Ltd  
KINGSTON ONT.  
Divers, Steam Pumps, Tugs, Etc.  
SUPPLIED ON SHORTEST NOTICE.

## TRADE NOTES.

Mr. George R. Carr, who has been representing for some time past the Dearborn Drug & Chemical Works of Chicago in the sale of boiler compound, has been very successful in making contracts for the coming season with the large steamship companies of the lakes.

A most unique catalogue has just been issued by the Hilles & Jones Co. of Wilmington, Del., on the subject of machine tools for working plates, bars and structural shapes. The catalogue is bound in yellow burlap which is stamped in red and black. It is profusely illustrated throughout with half tones of punching and shearing machines, every one of which is outlined and printed softly. The work is splendidly done.

Among the special marine work now under construction at the Marine Iron Works, Chicago, may be noted the following: A large amount of machinery for the Tabasco-Chiapas Trading & Transportation Co. (who do an extensive business in the tropics); complete stern paddle-wheel steamboat work for the Zaragoza Mining Co. of United States of Columbia; a pair of 9 by 36-in. stern paddle-wheel engines for Central America; set of 12 and 24 by 72-in. horizontal tandem compound condensing stern paddle-wheel marine engines; steel river steamer fitted out very complete for waters tributary to the gulf of Mexico; 80-ft. steam yacht for the St. Lawrence river. Among foreign countries at present represented by orders now under way are: Turkey, Holland, Brazil, Guatemala, Bolivia, Mexico, Ecuador and Canada. The Marine Iron Works' new plant is equipped with electric-driven power throughout, new machinery, etc.

The United States consul at Elbenstock, Germany, reports that the entire German fleet, naval and mercantile, will be supplied with wireless telegraphic instruments of the Slaby-Arco system before many years have passed. Forty vessels of the German marine are now fitted with this apparatus.

## Cabins and ..Staterooms

of modern vessels especially those in the passenger service should demonstrate the supreme possibilities of the wood finisher's art.

This demands a special varnish however, as atmospheric conditions are more destructive to varnish afloat than ashore and the ordinary article is of but little use.

The varnish best adapted to withstand the deleterious influences of wind, wave and weather is "BERRY BROTHERS' SPAR VARNISH."

Further particulars and a unique marine puzzle sent free for the asking. Write us.

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## "Seaboard Steel Castings."

MANUFACTURERS OF  
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST  
STOCKLESS ANCHOR.  
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON  
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OPEN-HEARTH STEEL CASTINGS  
OF THE HIGHEST GRADE.  
FACILITIES FOR CASTINGS UP TO  
80,000 POUNDS WEIGHT.

MACHINE WORK AND PATTERNS  
FURNISHED WHEN REQUIRED.

RAIL OR WATER DELIVERIES.

CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,  
CHESTER, PA.

"PRESERVO" WILL NOT CRACK, SCALE, FREEZE OR STICK—SEE PAGE 8.



OWNERS, Masters and Engineers of Lake Vessels may be interested in securing photographs of their ships. Possibly an owner would like a portfolio containing photos of every ship which he owns; probably masters and engineers would like a little album containing photos of the vessels in which they have sailed—in other words a photographic story of their life work.



The Marine Review is prepared to furnish single prints of vessels or portfolios of fleets. It has a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc., some the product of its own camera and others secured through established photographic agencies.



The price at which we furnish photographs is very low.



If you are interested call or write. If you call we will show you a portfolio of prints. Perhaps there might be one among them you would like.

THE MARINE REVIEW PUBLISHING CO.,  
39-41 Wade Building.

## CUNARD STEAMSHIP CO.'S ANNUAL MEETING.

At the annual meeting of the Cunard Steamship Co., last week, a dividend of 4 per cent. for the year was declared, which compares with 8 per cent. in 1900, 5 per cent. in 1899, 3½ per cent. in 1898 and 2½ per cent. in 1897. A gentleman who owns a limited number of shares (said to be two) attended the meeting and moved to sell the company to anyone who would offer par for it. The chairman replied that the company was in splendid condition and was worth far more than par. The gross earnings for the year were £1,394,620 and after paying all expenses a balance of £195,849 was left. Of this sum £164,356 was written off for depreciation.

The North German Lloyd liner Kaiser Wilhelm der Grosse arrived at New York this week, having covered the 3,146 miles from Southampton in 5 days 18 hours and 45 minutes, only 2 hours behind her record. Her average speed was 22.70 knots, which beats her own best previous record of 22.37 knots, and also the best record of her sister ship, the Kronprinz Wilhelm, which is 22.47 knots.

A number of very complete outfits of driving machinery and boat equipment, accompanied by plans and specifications for building the hull and installing the machinery, have been sent out by the Marine Iron Works, station A, Chicago. Several similar contracts now under way. This is a plan that they have demonstrated to be an exceptionally good one, particularly for those located at a distance where they may have suitable material and good men to do the work, provided they secured the necessary information with plans and details, all of which the Marine Iron Works furnish with their complete machinery outfits when so contracted for.

SEALED PROPOSALS will be received at the Office of the Lighthouse Engineer, Fifth District, Post-Office Building, Baltimore, Md., until 12 o'clock M., May 10th, 1902, and then opened, for furnishing materials and labor of all kinds necessary for the completion and delivery of the metal work for Hambrook Bar Beacon Light, Md., in accordance with specifications and drawings, copies of which, with blank proposals and other information, may be had upon application to W. A. JONES, Lieutenant-Colonel, Corps of Engineers, U. S. Army. Apr. 17.

## To Ship Owners and Naval Architects.

Energetic young man with twelve years' steel ship building experience (seven years ship yard and five years drawing room) is open for engagement as inspector of hull construction—tugs, barges, passenger and cargo liners. Versed in modern economical practice. First-class references. Address Inspector, care Marine Review Pub. Co., Wade building, Cleveland.

May 1.

## Compound Marine Engine for sale.

One fore-and-aft compound marine engine. Cylinders 16 and 32x30. In good condition; practically new. Will be sold cheap.

RIVER MACHINE & BOILER Co.,  
May 1. 108 to 114 River st., Cleveland, O.

## Tug For Sale.

Wood hull, 61 ft. long, 14 ft. 8 in. beam. Iron house. Engine 16½x18 in. Boiler pressure allowed, 140 lbs. Thoroughly overhauled this winter and ready for immediate use. Inquire C. H. Strong & Son, No. 622 Cuyahoga Bldg., Cleveland.

May 1.

## Boat Wanted for Lumber Trade.

WANTED—By a concern on the Atlantic coast about 500 miles south of New York, a good responsible shipping firm who can furnish an A1 boat to carry lumber by the thousand to New York and Boston. The mill to guarantee prompt loading and unloading, and work the entire year round. Would make regular charter with these guarantees specified. Would want boat to carry about one million feet at a load. Please give name of boat you furnish, with all particulars. Also rate she will insure at. Address Cape Fear Lumber Co., Wilmington, N. C. Reference—Mercantile agencies.

April 24.

## Tugs Wanted.

Wanted—To purchase or lease tugs of 65 to 80 ft. over all; engines 18x22 or 20x24, if low pressure; compound engines preferred. Must be in good order. Address Tugs, care Marine Review Pub. Co., Wade Bldg., Cleveland, O.

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., April 1, 1902. Sealed proposals for dock construction at Calumet Harbor, Ill., will be received here until 12 noon May 1, 1902, and then publicly opened. Information on application. O. H. Ernst, Lieut. Col., Engrs.

U. S. Engineer office, 428 Custom House, St. Louis, Mo., March 15, 1902. Sealed proposals, in duplicate, for building and installing two refrigerating plants will be received here until 12 noon, April 14, 1902, and then publicly opened. Information furnished on application. Thos. L. Casey, Major, Engrs.

April 10.

## BELLEVILLE GENERATORS

Grand Prix 1889  
Originated 1849

Hors Concours 1900  
Latest Patents 1902

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900....	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
1901.....	44,220	69,627	69,594	66,948	51,057	62,460	62,490	61,743	62,688	43,866	62,466	63,126
Total.....	801,723	783,264	714,378	664,371	438,576	418,836	355,173	271,257	234,870	172,596	148,416	115,266

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TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.